

AUTOMOTIVE INDUSTRIES

LAND AIR WATER

Volume 68
Number 13

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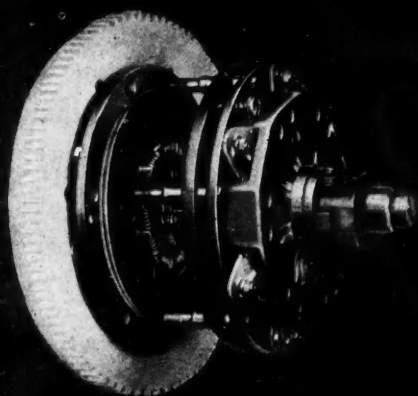
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April 1, 1933

Automotive Industries

AUTOMOTIVE INDUSTRIES

AUTOMOBILE

Volume 68

Reg. U. S. Pat. Off.

Number 13

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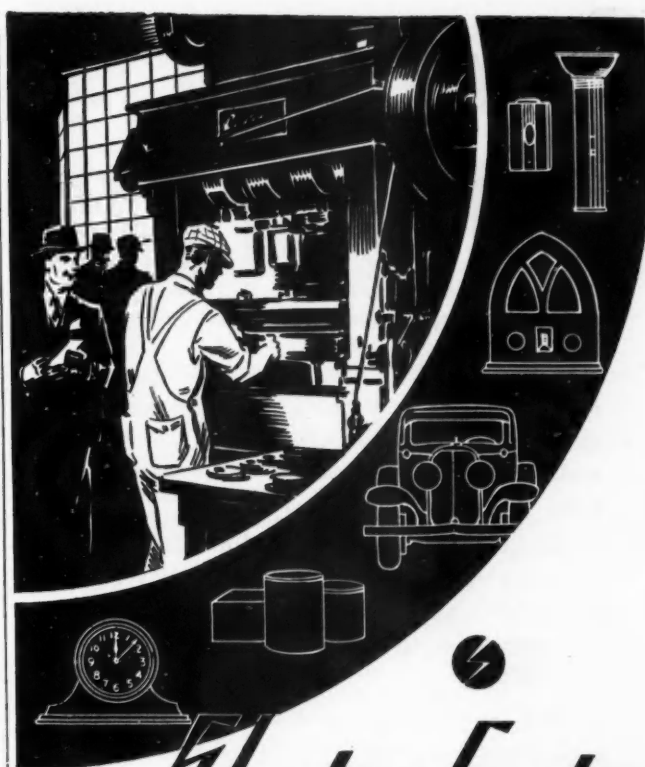
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Automotive Industries



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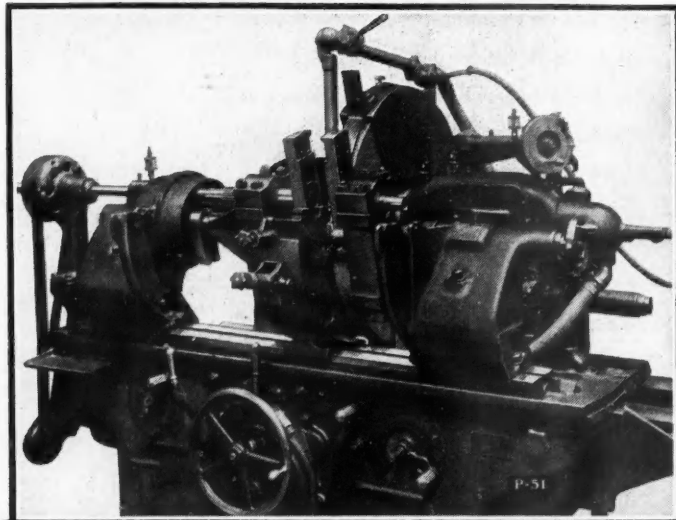
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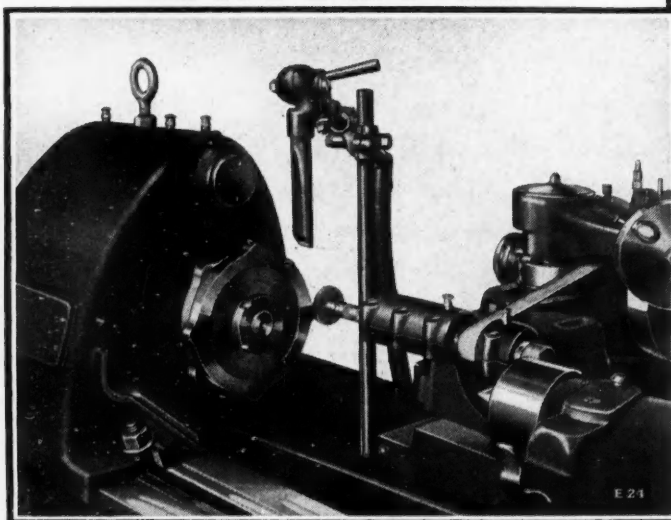
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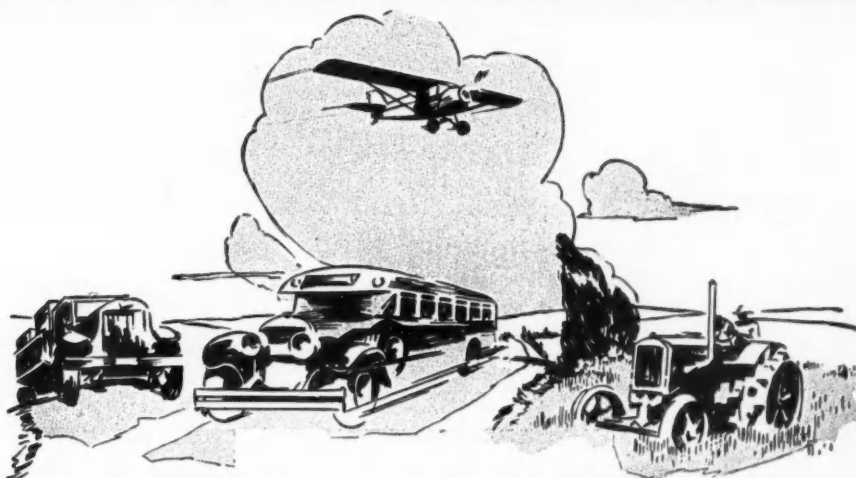
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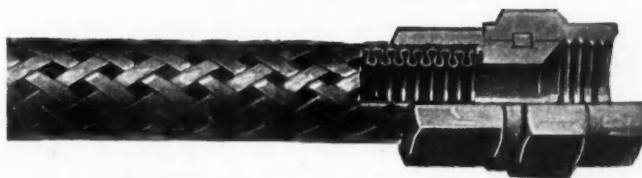
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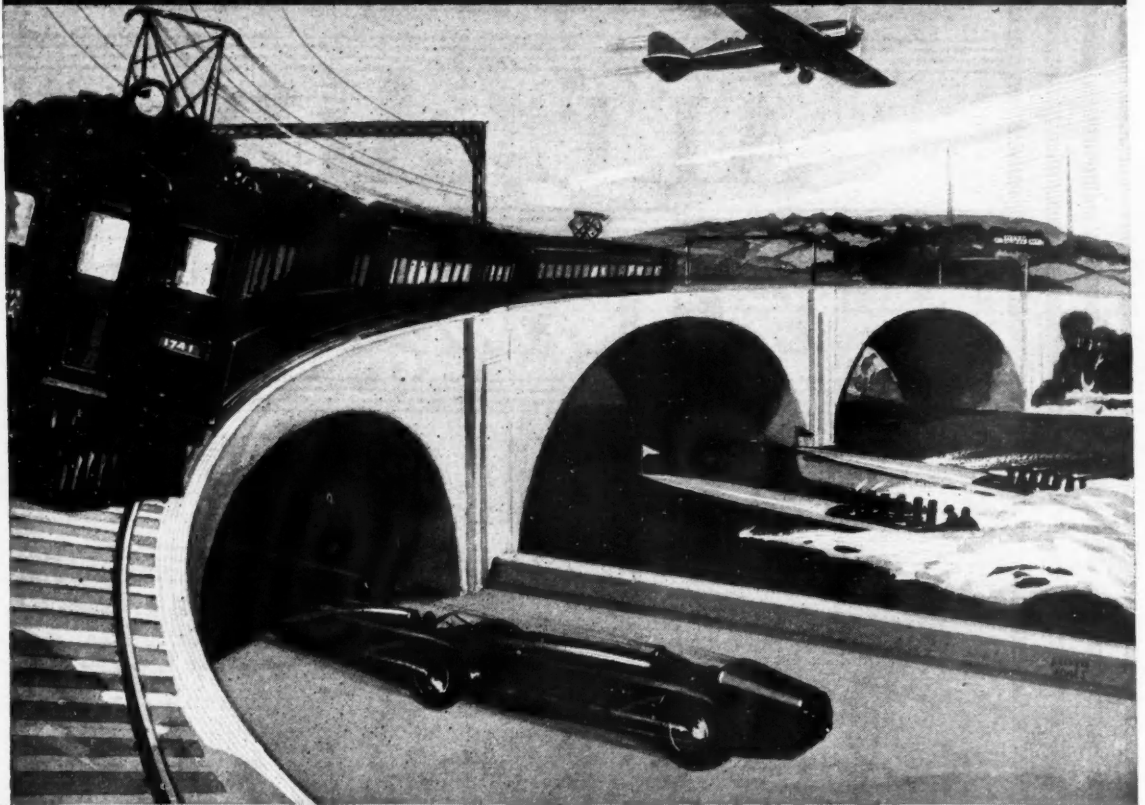
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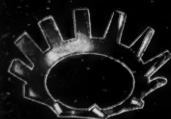
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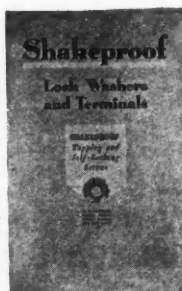
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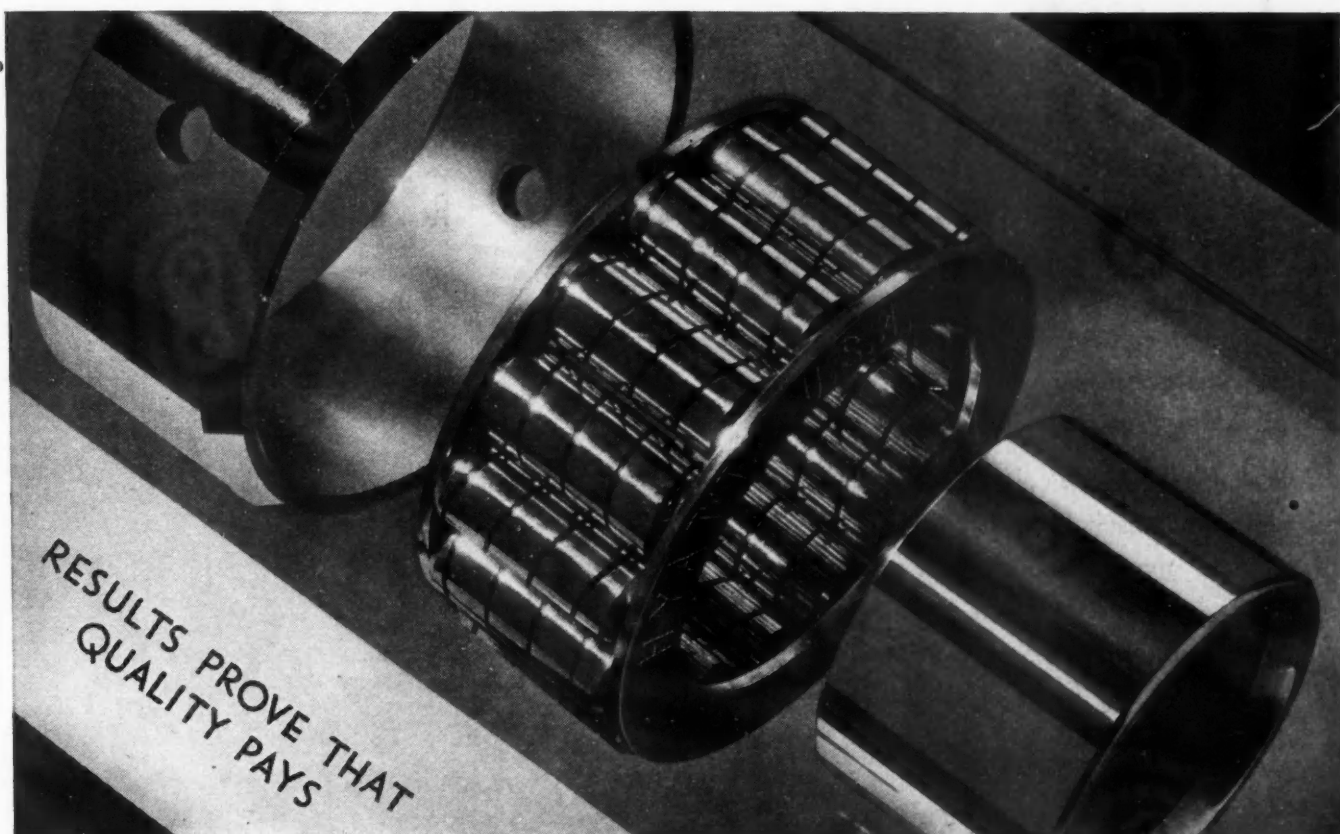
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April 1, 1933

Automotive Industries

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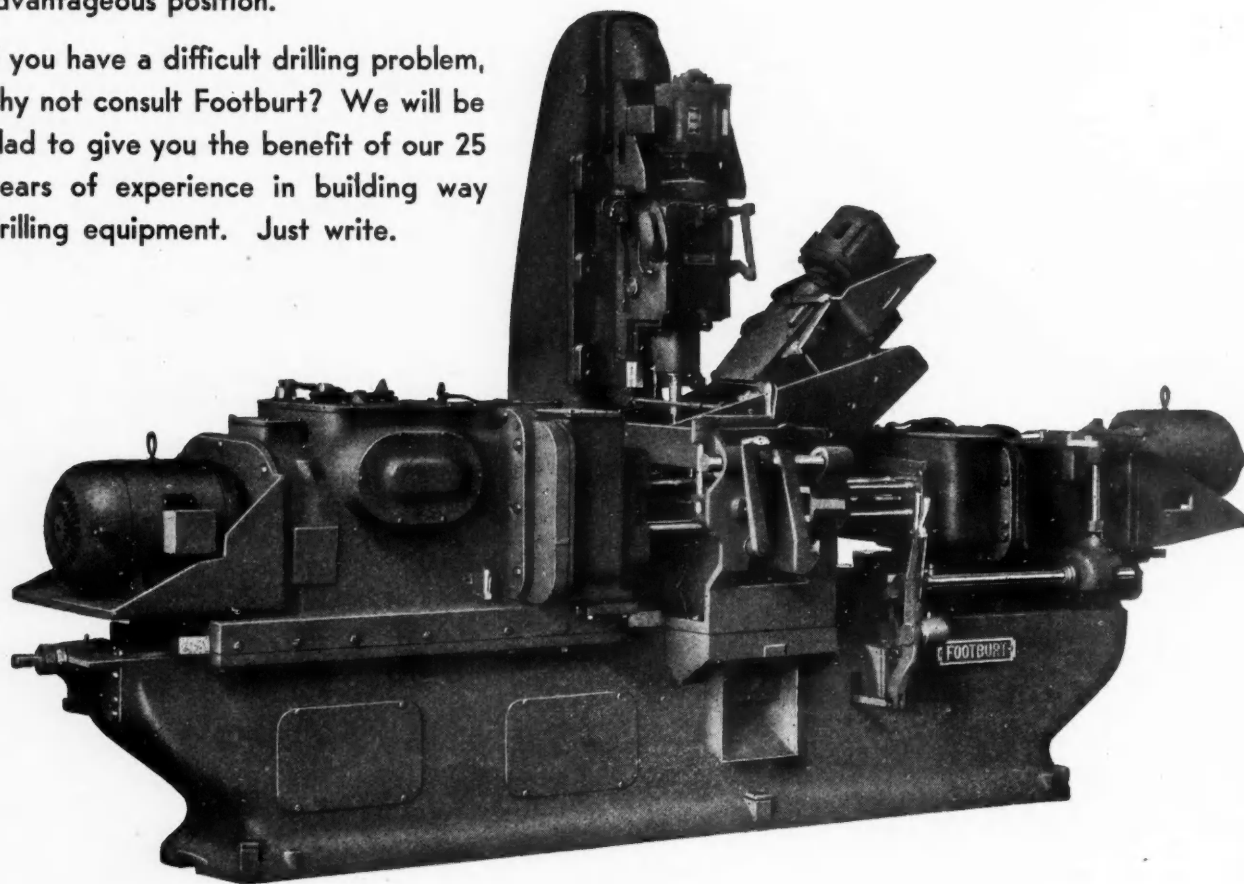
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April 1, 1933

Automotive Industries



by Don Blanchard
Editor, Automotive Industries

They Look Good But—

Does the public think 1933
bodies skimp comfort and
driving vision for style?

LIKE some of the gorgeous salads the ladies are so fond of concocting these days, the current body styles look swell but functionally they have their defects.

In fact, if those who believe that a thing must be functionally right to be beautiful have the correct slant, it can be argued that the 1933 body models aren't even good looking.

Be that as it may, the fact remains that current trends in body design recently have been the subject of some mighty pointed criticism from within the trade. Whether the public generally shares this critical attitude will remain an unanswered question until some factory finds out exactly what the public thinks about the way the industry is building bodies.

Functionally, there is no doubt that a body should be designed to carry its passengers comfortably. In addition it should provide a maximum degree of safety

and should make it as easy as possible for the driver to avoid accident. Critics of current designs insist that these requirements are fundamental. The artistic fundamentalists probably would say also that unless they are fulfilled, the body cannot be beautiful. Both contend that these basic requirements should not be sacrificed for style.

There is no doubt that to be stylish today a car must not only be low but it must look low. Since style is a sales factor to which the public apparently attaches considerable weight, designers can't just strive for comfort and let the exterior look like what it will.

The quest for low overall height in response to the demand for style, has exercised a profound influence on both chassis and body design in recent years. So far as the chassis is concerned, the reductions in its height probably should be regarded as salutary, because its lower center of gravity gives the car greater stability and hence makes it safer. Even this phase of the development toward lower overall height has not escaped unscathed, however, as there have been some kicks about the increased difficulty of servicing the lower vehicle.

Changes in body design directed either at actually reducing the overall height or at making the car look lower even if it isn't, on the other hand, have not been accepted nearly so widely as representing real progress. Some of the reductions in body height have been made by cutting the thickness of the roof and floor sections thus saving overall height. In general such savings are to be commended. The same commendation cannot be given in all cases where reductions in body height were made possible by cutting the thickness of the seat cushions or by reducing seat heights and making the angle between seat and back more acute. Where the decrease in cushion thickness has not allowed sufficient room for the cushion spring maker to do his stuff, and where the changes in seat height and angle have made leg- and belly-room inadequate, the result has not been satisfactory. And, of course, where roofs have been dropped even more than the seats, the tall, and in some cases even the moderately tall, have had reason to kick about insufficient clearance, particularly on rough roads.

While seats have been going down, belt lines, windshield bars and hoods have been going up in an effort to make the cars look lower by reducing the vertical dimension of the windows. The result has been that driving vision has been impaired and in some cars, short people actually have to crane their necks to get the road vision they desire. The right front fender has passed entirely from view but many drivers still feel that it is important to know just where it is, as the large number of cars on the road with fender markers gives evidence. In addition, the plane of vision-cut-off is now so nearly horizontal that there is a large blind area immediately in front of the car, and under certain conditions, being able to see portions of this blind area may be the difference between having and not having an accident.

Without wishing to over-emphasize the effect of high hoods and windshield bars on safe operation, there is nevertheless little doubt that from the standpoint of accident-prevention, this phase of recent body design development has not been an unmitigated blessing.

While on the subject of accident-prevention, much has been made of the increased stability and hence greater safety resulting from the lowness of current models. So far as reductions in overall height have reduced the height of the center of gravity, emphasis of this point is warranted. But reductions in body heights have played an insignificant part in this improvement. In other words, body heights (that is, from the bottom of the body sills to the high point of the roof) might be increased several inches simply by raising the roof without materially affecting the stability of the car. Exterior appearance, of course, would be affected, but possibly modifications could be made elsewhere to bring the design back into balance.

For example, take a 3000-lb., 56-in. tread car with its center of gravity 24 in. from the ground. Let's assume that there are two 150-lb. passengers in it and

that their center of gravity is 40 in. from the ground; also that the roof weighs 100 lb. and that its center of gravity is 69 in.

The effect of raising the roof, 1, 2 and 3 in. on the lateral stability of the car is shown in the following table:

Height of Center of Gravity of Roof	Height of Center of Gravity of Car With Passengers	Maximum Angle of Tilt
69 in.	25.454 in.	47° 45'
70 in.	25.484 in.	47° 43'
71 in.	25.515	47° 40'
72 in.	25.545	47° 38'

While the assumptions made may not be accurate, they are near enough to show that roof height has practically no influence on stability, and that from the standpoint of safety, roof heights can be made what headroom clearances demand. In any case, if maximum stability is desired, a 0.2 in. increase in tread will offset a three inch rise in the roof under the conditions assumed.

What is needed in the present situation are some facts to take the place of current speculation and scattered criticism. We are trying to build the kind of cars people want and the best way to find out what they want, is to ask them. This means a survey of sufficiently comprehensive character to give a sample of public likes and dislikes that is big enough to warrant conclusions.

One large manufacturer is known to be conducting an investigation along these general lines but whether this inquiry covers the important points raised here, has not been revealed. If it does, then it will be possible to evaluate the importance of current criticisms of recent trends in body design.

If any large number of people think that either comfort or safety has been sacrificed in the 1933 cars to get stylish lowness, the industry ought to know about it just as quick as it can get the facts.

If the public thinks cars should have better driving vision, more headroom, more legroom, more bellyroom, or more anything else, certainly the 1934 models should give them what they want.

Diesels Popular with French

THE outstanding development in the truck field in France (writes H. C. Schuette, assistant U. S. Trade Commissioner to Europe, Paris) has been the rapidly increasing popularity of Diesel engines for use in commercial vehicles. First exhibited in the 1928 Paris automobile show by Saurer, seven French producers are now turning out Diesel-powered trucks. These companies include Berliet, Compagnie Lilloise de Moteurs (Peugeot), Panhard-Levassor, Renault, Saurer, Unic, and Willeme. A number of other companies, notably Citroen, are considering bringing out Diesel engine models in the future. About 5000 commercial vehicles with Diesel engines are now in operation in France, and it is expected that their use will increase widely and rapidly unless there should be an unexpected radical change in the cost of gasoline and of crude oil. Although trucks equipped with Diesel engines cost from 10 to 25 per cent more than gasoline engine-powered units, manufacturers claim fuel economies up to 80 per cent. Heavy fuel oil costs 8 1/3 cents a gallon, roughly one-fourth of the price of ordinary gasoline. Numerous Diesel engines are used in freight services, competing with the railroads on long hauls. Renault is beginning the adaptation of the Diesel to light chassis.

JUST AMONG OURSELVES

When the Bull Wanes

BY THE time this is printed, Spring will have been with us officially for ten days. And along with the birds and the buttercups and the daisies, Spring is supposed to bring increased automobile and parts sales.

Sojourning in major urban centers as we do, we haven't checked up yet on the 1933 zoological and horticultural phenomena accompanying our entrance into Aries (the Ram, to you), but we have done some snooping about automobile sales.

Despite a certain number of optimistic statements from factory headquarters, it appears that business, following the reopening of the major banks, hasn't been brisk. It's been better than the paralysis of the financial holiday, to be sure, but sales are still in low gear.

That's better than being at rest, however, and there are indications that we are set for a steady, if slow, climb. And what with Arthur Brisbane's assurance that Henry Ford is going to advertise, and everybody else all set for intensive sales drives, it looks as though there might be real activity when, having passed through the sign of the Bull, we emerge into Gemini around the end of May.

* * *

Researchers

READING in Jose Ortega's "The Modern Theme" lately, we found some phrases which made us think of the automotive research man and the appearance of each apparently new

problem with which he is faced, despite the fact that the Spanish statesman-philosopher was writing of something quite different. Here it is:

"The investigator finds the thoughts of other people. . . innumerable traces of previous explorations, the signs of journeys attempted through the eternal jungle of problems, still virgin in spite of repeated violations."

* * *

Engineers Keep Plugging

ENGINEERING developments have been thrown definitely into the background during the past 30 days of financial stress and money tightness. Executives have had little time and no inclination to think about technical departments or scientific problems.

Engineers themselves have found it difficult to concentrate their minds fully on strictly mechanical and material operations. A part of humanity first and of a profession second, most of them are more concerned at the moment about those economic movements—specific and general—which will determine the business lives of their companies, than with improvement and modification of products.

Yet the work of the engineering departments goes on, steadily and purposefully, however money markets may seethe and boil. It goes on under present conditions perhaps with the troubled turbulence of a rushing mountain brook rather than with the calm placidity of a meadow stream—but it goes forward unremittingly. And when execu-

tives are ready a few weeks or months hence to turn back to every-day problems of operation, they will find new accomplishments on which to build and new developments from which to gain sales stimulation.

* * *

Controlled Employment

CONCENTRATION of production in large units in large cities does have the effect of drawing men in huge numbers to those centers for employment. And even in good times there always is a spread between total employment and total "employable" population. In bad times that spread is larger. In the present depression the spread has been greater in some important automotive centers than in any other depression since the beginning of the industry.

Better control of the size of working forces during boom times could offset this particular difficulty, of course—perhaps to a marked degree. More than one automotive production executive since the present depression started has expressed belief in the possibilities along this line.

"Don't take on too many men under pressure of peak load conditions," they are saying, "and you won't be faced with the necessity for such wide swings in total working forces. And workmen instead of flocking to the city will remain outside the large centers in greater numbers, thus promoting social stability all along the line."

Certainly responsibility for such control must rest in the hands of large employers of labor and large producers of automotive units. Concentration and size in themselves bring social and industrial responsibilities which never accrue to small units.—N. G. S.

Good Fuel Economy and Light Weight Feature

New Jendrassik Diesel

A 72-hp. six-cylinder
motor being built
by Ganz in Budapest

GANZ & CO., of Budapest, Hungary, which firm has been manufacturing high-speed Diesel engines for marine, railcar, and stationary purposes for several years, has recently placed in production the Jendrassik commercial-vehicle engine designed along similar lines. A brief description of the railcar engine appeared in *Automotive Industries* of Aug. 2, 1930, in a report of the Second World Power Conference held that year.

The new six-cylinder engine has a bore and stroke of 105 by 140 mm. (substantially $4\frac{1}{8}$ by $4\frac{1}{2}$ in.), which gives it a displacement of 443 cu. in. It develops 72 hp. at 1650 r.p.m., which corresponds to a b.m.e.p. of 96 lb. p. sq. in. The compression ratio is 12.4 to 1 and the compression pressure attains nearly 30 atms. or 427 lb. p. sq. in. Under normal load the fuel consumption is 0.44 lb. p. hp-hr. By the extensive use of light alloys it has been possible to keep the weight down to 1320 lb. or 18.3 lb. per hp. (without electrical equipment).

The crankcase, which is of the barrel type, is a one-piece casting of light alloy and is suitably ribbed. It carries the seven bronze-backed, babbitt-lined main bearings, six of which are supported by two-part bulkheads. An oil sump is formed in the crankcase at the rear end. Access to the interior of the crankcase may be had through openings

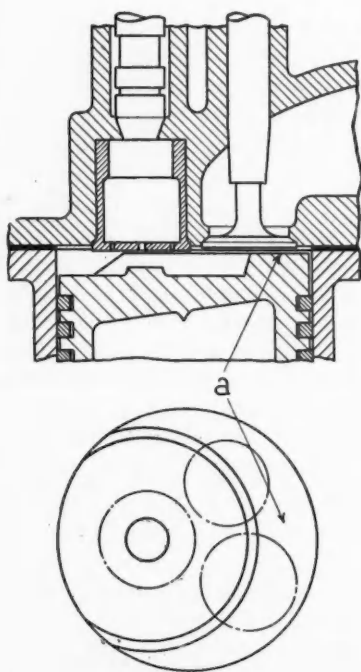


Fig. 1—Combustion chamber of Jendrassik engine

with bolted-on covers. Cylinder blocks and cylinder heads are secured to the crankcase by means of "through" bolts. The crankshaft is a drop forging of nickel-chromium steel and is drilled for pressure lubrication of the crankpin bearings. Oil throwers are provided at both ends of the shaft, to prevent leakage from the case. At the forward end there is a vibration damper. Camshaft drive is through wide-faced gears with helical teeth, these gears being located at the fly-wheel end where there is no torsional vibration. These gears are lubricated by oil thrown off by the crankshaft. In the big ends of the I-section connecting rods there are babbitt-lined bronze bushings, while the small ends have gun-metal bushings. Lubricating oil is carried from the big to the small end of the connecting rod for pressure lubrication of the piston-pin bearing, and for a nozzle on top of the connecting rod which sprays cooling oil against the under side of the piston head. The pistons are gray iron castings and are fitted with four compression rings and one oil scraper ring each. The piston speed is a trifle over 1500 ft. p. m. The main part of the compression chamber is formed in the piston head (see Fig. 1). There is very little clearance over a part of the piston at the end of the up stroke, and violent turbulence is produced in the combustion chamber as the piston approaches the end of the up stroke.

Cylinders are cast in pairs, of iron. Cylinder bores are honed to a smooth finish. Removable covers on the pushrod sides give easy access to the valve gear, and cocks are provided for draining the water jackets.

A governor at the rear of the engine and driven through the camshaft gear, limits the speed of the engine to a maximum of 1750 r.p.m. and a minimum of 250 r.p.m. The governor is of the centrifugal type and varies the duration of the fuel-injection period. Engine speed is under the control of the driver. A compression-relief device is provided to facilitate starting. Compression relief is effected by moving the camshaft axially to bring a special set of cams into action which keep the inlet valves open during the

By
Charles
Danninger

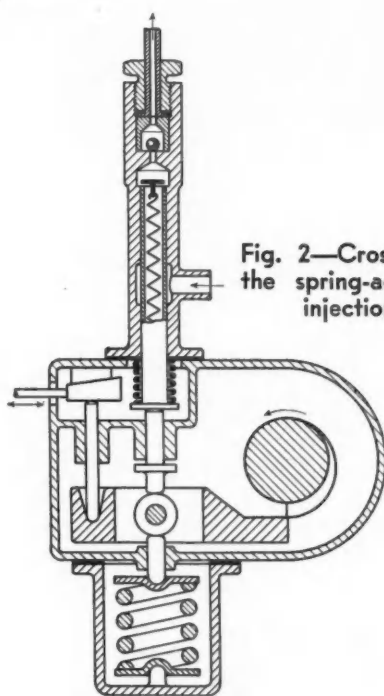


Fig. 2—Cross section of the spring-actuated fuel injection pump

compression stroke. There is also a set of intermediate cams which keeps the inlet valves closed till near the end of the inlet stroke. Then, when the valves are opened, there is a high degree of vacuum in the cylinders, and atmospheric air on flowing into this partial vacuum, is heated. Starting with a higher initial temperature, the temperature of the air is higher also at the end of the compression stroke, and ignition of the first few charges is therefore facilitated. After the engine has started the camshaft is moved into its normal position, which gives the usual valve timing.

The camshaft is supported in seven bronze-bushed bearings that are lubricated by splash. Valves are made of chromium steel, heat treated, and each valve has a renewable guide and two concentric springs. A Delbag air filter is secured to the air pipe. The finned exhaust manifold has its downtake at the front.

Cylinder heads also are cast in pairs, of iron, and there are copper gaskets between the cylinder blocks and heads. An aluminum cover forms an oil-tight chamber for the valve mechanism.

The precombustion chamber is offset from the axis of the cylinder and has several orifices. The atomizer, which is arranged vertically, injects fuel into the precombustion chamber under a pressure of 1700-2200 lb. p. sq. in. A portion of the fuel injected is burned in the precombustion chamber, thereby causing a rise in

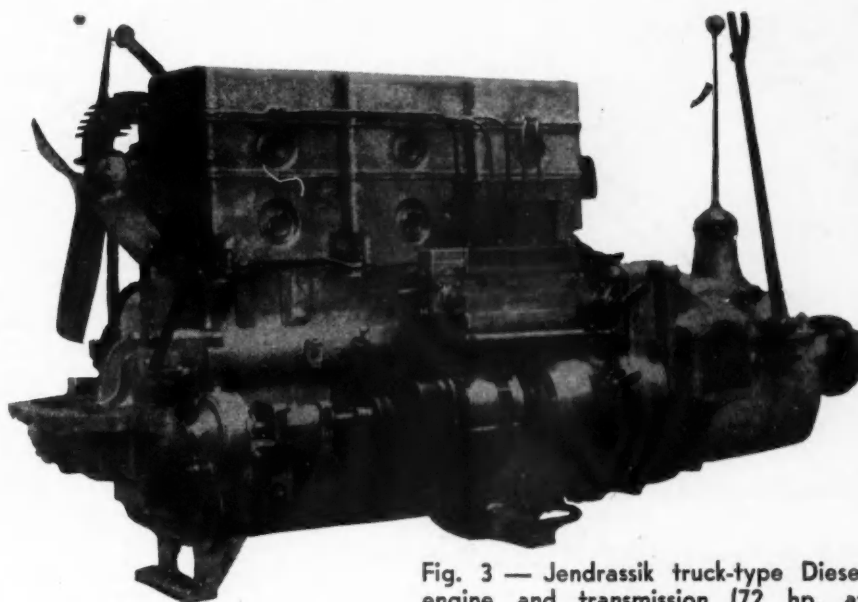


Fig. 3 — Jendrassik truck-type Diesel engine and transmission (72 hp. at 1650 r.p.m.)

pressure therein, which causes the contents of the chamber to be blown through the orifices in the bottom of the chamber against a raised surface on the piston head. Upon rebounding from this surface the fuel spreads through the combustion chamber in all directions and mingles with the swirling air, so that the combustion is completed. The engine is really intermediate between the ordinary precombustion-chamber type and the direct-injection type, which calls for a good intermixture of fuel and air, and the system combines good combustion efficiency, considering the relatively low compression ratio, with the well-known advantages of low peak pressures.

A vane-type oil pump, driven through helical gears from the rear end of the crankshaft, draws oil from the sump through a strainer, forces it through a water-cooled temperature regulator and a micro-filter into the oil manifold connecting to all of the main bearings. The rate of oil circulation is controlled by the governor in such a manner that the rate of oil delivery to the various bearings increases with the speed of the engine.

A sectional view of the interesting fuel injection pump is shown in Fig. 2. The plungers of the fuel pump are spring-actuated, with the result that the pressure of injection is independent of engine speed. The amount of fuel injected is varied by varying the stroke of the plunger. This is accomplished by means of the wedges of which one may be seen at the left in the drawing, which are connected to the accelerator pedal.

The fuel system also comprises a pump which delivers the fuel under low pressure to the injection pump. It fills the annulus surrounding the suction ports, and passes thence through these ports and through the hollow plunger, at the upper end of which a check valve is located. At the upper end of the pump chamber there is a ball check valve, which serves to prevent the return of the high-pressure oil into the pump. There is a micro-filter also in the inlet line to the pump, to prevent abrasive material from getting in.

An open-type atomizer is used, with a single, unusually large orifice, 0.040 in. in diameter. There is a check valve in the nozzle body. Cooling water is circulated

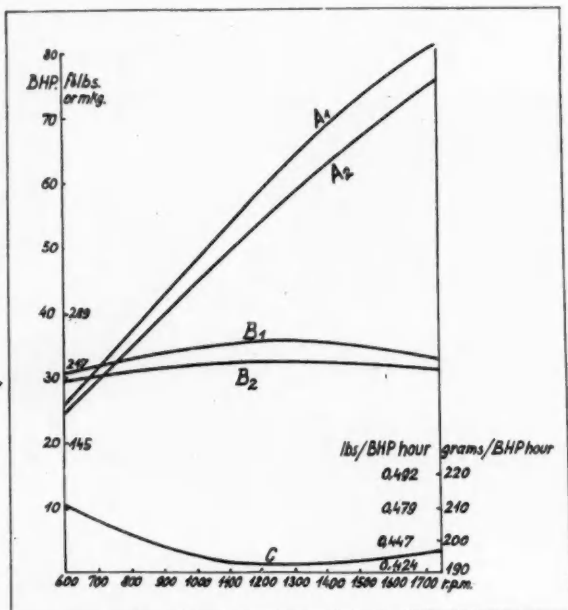
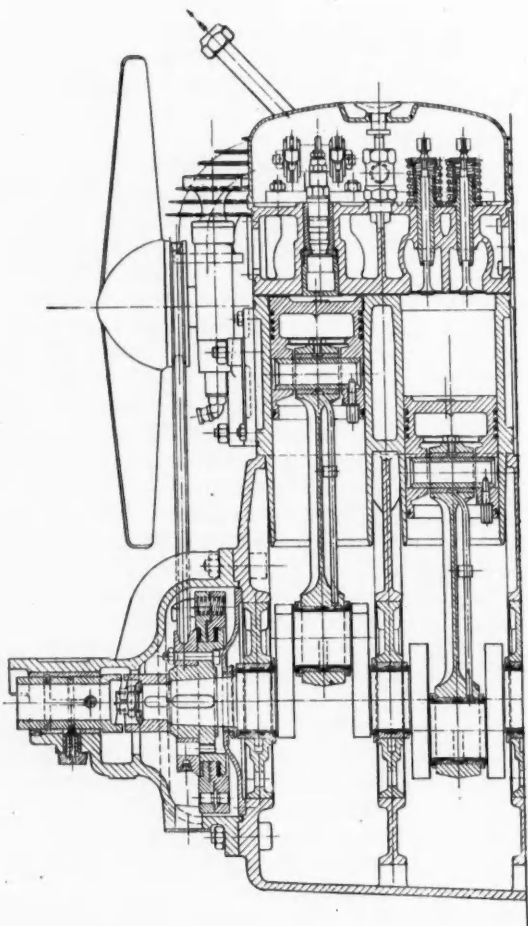


Fig. 4

- Curve A₁ indicates maximum power
- Curve A₂ indicates normal power
- Curve B₁ indicates maximum torque
- Curve B₂ indicates normal torque
- Curve C indicates fuel consumption at normal load



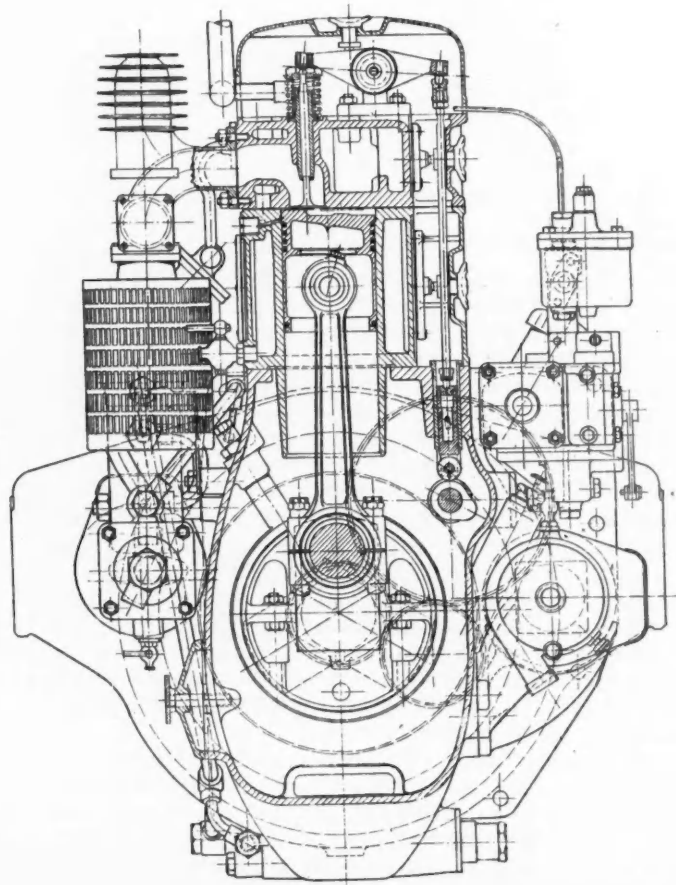
by a gear-driven centrifugal pump, and the four-bladed light-alloy fan is driven by a V belt, the tension of which can be adjusted by means of an adjusting screw with knurled head.

Starting is effected by means of a 12-volt electric starter, and an electric generator of the voltage-controlled type is fitted.

A large six-wheeled bus originally equipped with a gasoline engine had this engine substituted for the original powerplant. The bus weighed 16,400 lb. In the experimental operation of the bus and in regular service it showed plainly the chief advantages of the Diesel engine—fuel economy and a high degree of flexibility. Curves of horsepower, torque and fuel consumption are given in Fig. 4. The average consumption of Diesel oil was 1.035 lb. per mile or, counting one U. S. gallon as 7 lb., 0.148 gal. per mile, or 6.75 miles per gallon. This compares with 3.3 miles per gallon of gasoline of the bus with its original engine. This corresponds to a reduction in the fuel consumption on a volumetric basis of 51.5 per cent.

In operation the engine has a clear exhaust, and no objectionable exhaust odors are noticeable inside the bus. The engine starts directly from cold and the bus can be driven off immediately with a full complement of 52 passengers.

Fig. 5—Sectional views of Jendrassik truck-type Diesel engine. Note large inlet silencer and finned exhaust manifold



SMALLER CYLINDERS BUT MORE OF THEM

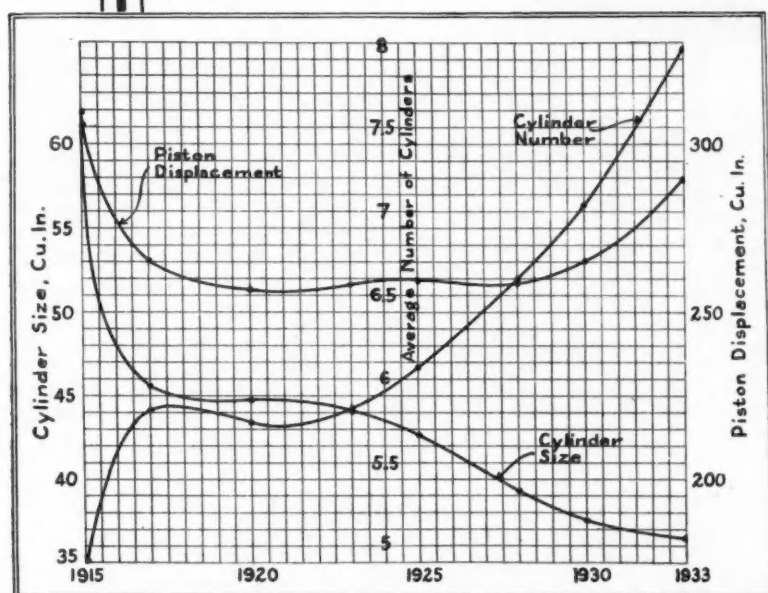


Chart showing variation in engine practice during 18 years

SOME years ago the advantages of small cylinders were discussed in these columns on a theoretical basis, and it was shown that, since an engine with small cylinders can be operated at a higher speed and at a higher compression ratio, it will develop more power per unit of displacement. Recognition of this fact should have led to a decrease in cylinder sizes, and an investigation of the records shows that cylinders actually have grown smaller consistently over a long period.

Of course, the question of cylinder size is closely tied up with that of cylinder number. When a new model is being considered, the question of how many cylinders its engine is to have usually precedes and is considered of more importance than that of the exact size of these cylinders. But even though the decrease in cylinder size may be a direct consequence of the trend toward larger numbers of cylinders, which is based chiefly on the desire for greater smoothness of operation, it is comforting to know that the increased smoothness thus attained did not have to be purchased at the cost of a loss in specific output, but, on the contrary, achieved a gain in this direction also.

That has been the design trend during the last twelve years

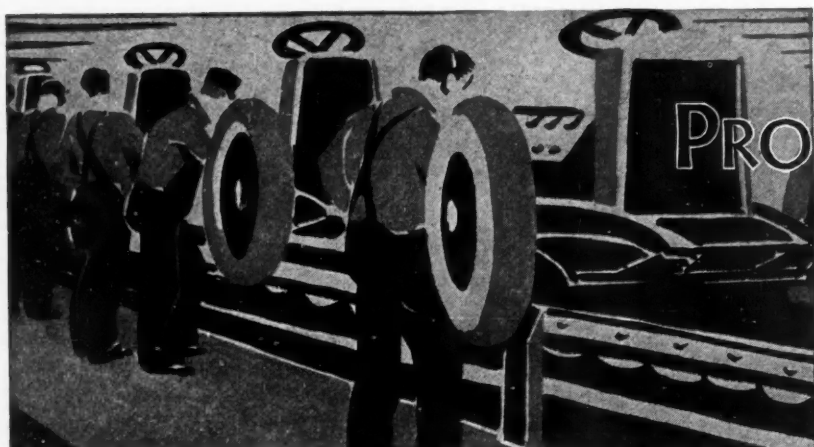
By P. M. Heldt,

Engineering Editor,
Automotive Industries

As the chart reproduced herewith shows, the average displacement of a single cylinder of passenger-car engines decreased from 62 cu. in. in 1915 to 36.5 cu. in. in 1933. The former displacement represents substantially that of a cylinder of 4 in. bore and 5 in. stroke (62.8 cu. in.), while the latter is about that of a cylinder of $3\frac{1}{4}$ in. bore and $4\frac{1}{4}$ in. stroke (35.3 cu. in.). As the curve shows, the decrease in cylinder size has been continuous, if we consider only the particular years, spaced by two- or three-year intervals, for which calculations were made, but it has been far from uniform. From 1915 to 1917 cylinder sizes decreased very rapidly; they then remained substantially stationary for the next six years, when another move toward smaller sizes set in which has continued ever since.

The first big decrease in cylinder sizes is readily explained by the fact that at about the time where the records of the chart begin the Cadillac V-8 was introduced, and this was followed the next year by the Packard Twin Six, each of which event represented the doubling of cylinder numbers by the firm concerned. During the next two years a large part of the industry followed the lead thus established, as indicated by the fact that in 1917 no fewer than nine distinct twelve-cylinder models were listed. Quite a number of V eights also were brought out, and there is no doubt that these developments in the higher-priced field also had its repercussion in the lower priced section of the industry, where four-cylinder models still predominated in 1915.

All of the twin-sixes disappeared from the market again later on, and the same fate was shared by some
(Turn to page 400, please)



PRODUCTION LINES

Shop Kink

From Westinghouse comes an interesting idea for altering patterns temporarily or permanently with but little expense. It is particularly useful in dealing with large diameter gears or cylindrical forms. If a change is desired in diameter or thickness of wall section, time may be saved by building up with scrap linoleum. You can take it off when the special job is done.

Thermal Expansion of Aluminum Alloys

THE coefficients of thermal expansion of commercial aluminum alloys vary over a considerable range, according to a paper by L. W. Kempf of Cleveland, O., read before the American Institute of Mining and Metallurgical Engineers. Mr. Kempf gives a table containing the compositions of fifty Alcoa alloys and their coefficients of thermal expansion between different temperature limits. Taking the temperature range 68-572 deg. F., the highest coefficient of thermal expansion is 0.0000150, that of Alcoa 70S, which contains 1.0 per cent of copper, 0.4 per cent of magnesium, 0.8 per cent of manganese and 9.0 per cent of zinc. The lowest coefficient of thermal expansion is 0.0000116, that of Alcoa 132, which contains 1.0 per cent of copper, 1.0 per cent of iron, 14.0 per cent of silicon, 1.0 per cent of magnesium, and 2.5 per cent of nickel.

Aluminum Coating

Some time ago we mentioned the advent of Permite Resalum, an aluminum heat-resisting coating. Now we find that this paint has

been adopted for the motor block, manifold, and exhaust pipe of the 1933 Dodge. This coating is ready mixed in a synthetic resin vehicle and may be diluted to any desired consistency by the use of Permite thinner. It is reported that on the engine finishing job, from 14 to 16 units were coated with one gallon of Permite Resalum, whereas only 4 to 5 engines were previously finished with a gallon of oil paint.

Latex Facts

In view of the great interest in rubber latex all over the world, *The Rubber Growers' Assn.*, of England, has published an important technical pamphlet entitled, "Rubber Latex." It deals with the properties, composition, manipulation, and compounding of latex and latex pastes. Vulcanization, dipping, and electro-deposition also are covered. One section is devoted to a selected list of over 500 recent British patents which may be of great interest to technologists in this Country. Shall we get you a copy?

Long and Short

Last week a steel company in Youngstown, Ohio, received an order for 14,000 tons of steel, one of the largest given out here in recent years. Today another company, the Cold Metal Process Company, received the smallest order on record—for one-quarter of a pound of steel.

The quarter-pound order is for steel strip six inches wide and .001-inch thick, the thinnest steel rolled. The quarter-pound will require a twelve and one-half-foot length of the six-inch-wide strip. The order is worth 50 cents. Such strip is made in coils of 1200 pounds, the

strip being more than eleven miles long. Newspapers say so.

Infinite Variety

"Bakelite Laminated," is more than a bulletin describing applications of this versatile material. Rather, it is a technical hand book containing much of value to engineers and production executives. Within the covers of this little volume is information concerning the manufacture of Bakelite laminated material, industrial and automotive applications, colors, etc. Production men will find a section discussing the working of this material by sawing, drilling, turning, and the like. A copy is yours for the asking.

Free-Cutting

More light is shed on the properties of free-cutting brass by Alan Morris in a paper, "Machinability of free-cutting Brass Rod, 2," which was read at the last meeting of the A.I.M.M.E. The following conclusions were reached after a series of tests to determine the effect of variation in content of tin, iron, and copper:

1. Addition of tin up to 0.25 per cent has little effect on hardness or resistance to cutting. Further increase in tin content to 0.75 per cent causes moderate increase in hardness and unit cutting energy.
2. Additions of iron up to 0.5 per cent are accompanied by a moderate improvement in cutting properties, but cause material hardening.
3. In well homogenized material variation in copper content from 58.0 to 63.0 per cent has little effect on resistance to cutting. Increase of copper content from 63.0 to 65.0 per cent is accompanied by a moderate increase in unit cutting energy.—J. G.

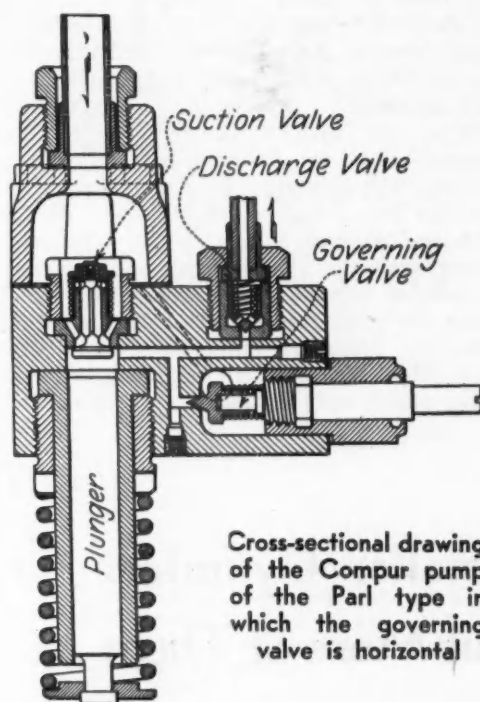


Compur Pumps

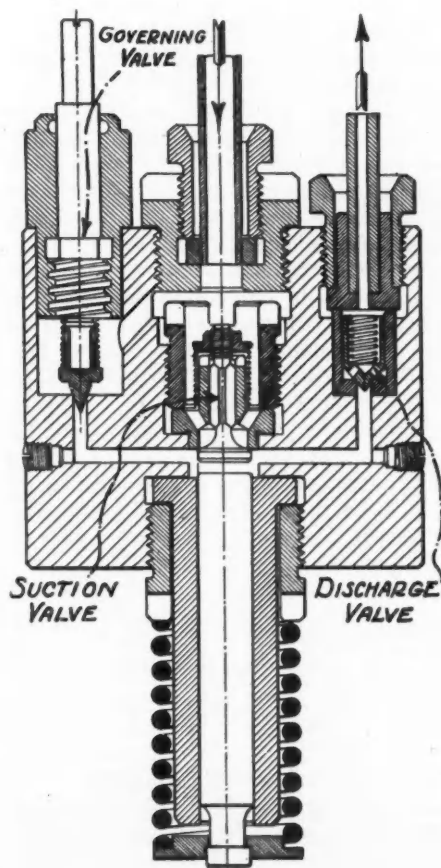
for fuel injection on Diesel Engines

THESE pumps, which are the product of the firm of Friedrich Deckel, Munich, Germany, which is represented in this country by Nicholas Fodor, M.E., New York, are supplied either with or without drive. They are alike in design except for the location of the governing valve, which is vertical in the PAR and horizontal in the PARL pump. When supplied without drive only the pump assembly proper, as shown in the illustration reproduced herewith, is supplied, the pump plunger then being operated by the engine camshaft through the intermediary of the usual tappet-type cam-follower, or by a rocket-type cam-follower. When supplied complete with drive, the drive is incorporated in a casing and the whole pump forms a complete unit.

The pump assembly without the drive consists of the following main parts: The body which is a one-piece steel forging into which the individual assembly



Cross-sectional drawing of the Compur pump of the Parl type in which the governing valve is horizontal



In the Par type pump the governing valve is vertical

of the suction valve; the plunger and its guide; the governing valve and its guide, and the discharge valve are screwed in. The suction chamber with the suction line is bolted to the top of the body.

The type PAR and PARL pumps are of the cam-operated, constant-stroke type and the entire fuel cam lift is used for injecting the fuel. The quantity of fuel injected per stroke is controlled by means of a non-return needle type by-pass valve.

As the pump plunger is being raised by the cam, fuel is forced from the pump cylinder through the check valve, shown at the upper right in the cross-sectional view of the pump. Since the pump plunger delivers a constant quantity of fuel at every stroke, the regulation of the quantity of fuel delivered through the check valve to the injectors is effected by varying the opening of the needle type by-pass valve which valve by-passes the fuel during the entire stroke of the pump plunger. If this needle valve is entirely closed then the full quantity of fuel delivered by the plunger is sent to the injector. When the needle valve is opened more or less fuel will be delivered to the injector in accordance with the extent of the opening. The diameter of the fuel pump plunger and the cam lift are so selected that even at overloads the by-pass valve is not closed entirely but has a slight opening. The by-pass valve will therefore serve also as a safety valve. The opening or closing of the needle of the by-pass valve is effected by a lever which is connected to the governor; or, in case of manual control, to the accelerator. An angular movement of about 30 deg. of the needle is sufficient to control the engine from stop to overload. The levers on the needle valves of a mul-

multiple unit pump or those of the single unit pumps are all connected together by a common pull-rod and the equalization among the individual units is accomplished by the setting of the individual lever on the needle valves in relation to each other.

The by-passed fuel is returned to the suction chamber of the pump, which is arranged on top of the pump body. From this suction chamber the pump draws its supply of fuel during the suction stroke through the inlet valve which is of the customary poppet type.

All parts of the pump are made of alloy steel, with the exception of the pump body, which is a one-piece steel forging in which the independent assemblies, such as inlet valve, check valve, plunger and its guide, by-pass valve, are screwed in. The plunger and its bushing, the complete inlet valve assembly, and the complete check valve assembly are made of steel hardened and ground to a close fit. The needle of the by-pass valve is a hardened steel piece and its guide is made of bronze. By using lapped surfaces for all joints the need for gaskets in the pump assembly is obviated. Since the pump plunger and its guide, the inlet valve, etc., are all independent assemblies held in the pump body by gland nuts or screws, it is pos-

sible to replace them in case of wear or injuries without difficulty.

The load on the by-pass valve caused by the by-passed fuel is taken up by the threads of the needle valve, and therefore the governor has only to overcome the friction on the threads, which is practically negligible. Otherwise it is impossible to transmit any shocks from the pump to the governor and, therefore, a governor of dimension, not exceeding those of governors now used for gasoline engines, is sufficient for this type of pump.

The drive for the type PAR and PARL pumps is very similar to that used with other Compur pumps, with the exception that instead of rocker type of cam-followers, tappets are used for operating the plungers. The cams are also integral with the camshaft, which is carried on standard roller bearings in both sides of the pump casing. The pump casing itself is made of aluminum. The complete pump can be fastened to the engine either by studs or by clamps. The camshaft is carried out on both sides of the housing and the pump can be driven from either side.

Cams and tappets are lubricated by splash from the oil chamber in the pump casing.

Smaller Cylinders But More of Them

(Continued from page 397)

of the V eights. The advance in the direction of cylinder multiplication evidently had been either too rapid for the public to fully appreciate it, or else for the general technical progress of the art, and it will be seen from the curve of average cylinder number that after 1917 this number decreased and did not reach the 1917 figure again until 1923. The slump of 1920, of course, had the effect of sweeping away some of the creations designed primarily to meet the demands that arose out of war-time and price-inflation prosperity.

Another noteworthy fact brought out by the chart is that the average total cylinder displacement decreased sharply after 1914, from 304 cu. in. for 1915 to 265 cu. in. for 1917. This decrease in total displacement was made possible by a rapid increase in engine speeds, so that more power was obtained from the 265 cu. in. engines of 1917 than the 304 cu. in. engines of 1915. The Cadillac V eight, introduced in the Fall of 1914, had a speed of 2400 r.p.m., while most other engines of that period developed their maximum horsepower at somewhere between 1500 and 1800 r.p.m. The Cadillac set the style in this respect during the next few years, and engine speeds generally increased considerably. A reduction in the size of individual cylinders was one of the changes that made this increase in speeds practicable.

It is rather remarkable that from 1917 to 1923 every one of the factors charted in the diagram—total displacement, cylinder number, and cylinder size—was remarkably constant. But in 1923 another movement set in, evidently due chiefly to the ascendancy of the straight eight. The total displacement remained substantially constant for another five years, and the decrease in cylinder size therefore corresponds almost exactly to the increase in cylinder number.

After 1928 the increase in cylinder numbers continued, but was accompanied by an increase in total displacement, so that although cylinder sizes continued to decrease, the rate of reduction decreased and the curve appears to have practically leveled out.

One rather remarkable fact is that during the current depression, starting in 1930, the total piston displacement and the average number of cylinders have increased, the cylinder number quite rapidly. In 1930 the cylinders per car averaged slightly more than seven, in 1933 they are practically up to 8. Today the eight-cylinder car is the normal type, the fours and sixes being balanced by the twelves and sixteens.

This development seems to have been rather contrary to those in the economic field, for an increased number of cylinders and increased piston displacement certainly represent increased luxury, while economic conditions should have pointed to an opposite course as more appropriate to the times. It may therefore well be that, as in 1917, we have reached a point of unstable equilibrium in the matters discussed in this article, and that it would be unsafe to predict future developments from those of the past few years, by projecting the curves.

Rosengart to Represent Adler

Washington, D. C.—The Department of Commerce is advised that the Adler Company, Frankfort-on-Main, has contracted with the Paris firm of L. Rosengart whereby the French firm agrees to represent Adler in France for three years and to manufacture Adler cars in France on a license basis. Rosengart so far has been manufacturing a French edition of the British Austin.

To RAISE PRICES—

by C. A. Musselman
President, Chilton Co.

Start from the GROUND UP



C. A. Musselman

THERE are four distinct lines of thought leading to a consideration of the problems involved in the increasing of commodity prices. The first is that prices cannot be raised until wages are raised and there is less unemployment. The second is that there cannot be greater employment and higher wages until prices are raised; the third, that higher wages, greater employment and advanced prices must come simultaneously; and the fourth, that the "upping" of prices must start with agricultural and other products which come out of the earth.

The theory back of this fourth line of thought is that the restoration of buying power to the farmer, through an increase in the prices which he receives for his products, will create and promote the much-needed increase in demand for manufactured articles.

The question has been asked: "How can the department store and general retail merchant raise prices under present conditions?" A sane answer to this query would be that if the farmer receives increased prices for his products he will become a potent factor in the purchase of merchandise. This, in turn, will stimulate prices of raw materials, and will compel manufacturers to charge more for their products, with the further result

that the retailer will pay more for what he buys and consequently charge more for what he sells.

It is unreasonable to expect that through arbitrary methods, prices of all products from the raw materials to manufactured articles can be simultaneously advanced. We must start at the beginning, with commodities such as foods, coal, oil, timber and metals. As the prices of these advance, the prices of secondary products will have to go up and when this "upping" starts, manufacturers and merchants will add a sufficient increase to their costs to return them a profit in the conduct of their business.

We hear almost endless discussions of the relative advantages and disadvantages of inflation, deflation, gold embargoes, banking control and security. Are we being led astray by an over-emphasis of these more or less academic questions? Are we overlooking the simple but fundamental facts that

buying power cannot be restored without profits and that profits cannot be earned without increase in volume and—in most instances—an advance in prices?

Today, products of the earth are being marketed at a loss to the farmer and miner and the majority of manufactured articles are sold at less than cost, if overhead is included.

The reading of the financial statements of our industrial corporations reflects unfavorable conditions and clearly indicates that when capital surpluses are exhausted, many corporations must surrender to the inevitable and either be reorganized or liquidated. This situation is so general that it seems illogical to anticipate any great or continuous improvement in the employment and wage situation until the business man can sell his products at prices that will return him a profit. If we do not save the ship, it doesn't make much difference what wage the sailor gets.

It is only out of profits that industry can expand, can employ more men and women and pay higher wages. It is only by the "upping" of prices first and the increase in volume afterwards that it will be possible to obtain a net revenue for industry that will justify those actions which will increase buying power.

The question—Which must come first, wage increases or price increases? may not seem very much different from the question—Which came first, the hen or the

egg? But it is much easier to answer.

In considering the advantages of the "upping" of prices, it is well to keep in mind that the object is primarily to turn losses into profits and not to increase profits for those few individuals and corporations who are today making money.

There may be some who will attempt to show that when properly financed and managed, with the reduced overheads which have become prevalent recently, business corporations should make profits. In theory this is fine; but in practice it does not work out, because today the majority of our business enterprises which were properly financed have dissipated their surpluses, and in many cases their capital, and losses are continuing regardless of the number of economies which have been put into effect.

Another question sometimes asked is "Will not an increased volume of business in manufacturing and sales solve the problem?" The practical answer to this is that there will be no increased volume until profits are in evidence, and that, to bring about an increase in volume, the "upping" of prices will have to come first.

Ask any merchant or manufacturer how he expects to increase his volume if his customers cannot make money? A few homely facts

of this kind should prove the need of "upping" of prices before other moves are made or can be made.

As a counter argument some may ask, "Who is going to buy if prices are advanced?" To them it can be said that regardless of the financial condition of the individual or business organizations, buying is always stimulated by a rising market.

There have been organized throughout the country innumerable groups which call themselves this committee, or that society, or some other association. They are volunteering their services for research study and the recommending of plans which may bring back prosperity, but in most instances their compilations of statistics, their findings and recommendations deal with involved matters and considerations which are more theoretical than practical.

What we need today is mass action by hard-headed business men who do not have to be told that they cannot save their businesses without increased volume and increased prices. These two factors are sufficient to get us out of the depression and put us on the road to success. The solution of the whole problem is to find a way of turning losses into profits, and to so do, the first move is the "upping" of prices, starting with the things which come out of the ground.

However, to realize the economic advantage of this arrangement it is necessary to set up the right kind of grinding equipment within the central tool room and man it with trained men. Moreover, time becomes a governing factor since the tips must be rough-ground first and then finished to size without sacrificing any of the over-all economy.

Because grinding time controls the situation, it is desirable to select the kind of grinding machine and grinding wheels that will do the job in the shortest time. In this connection Mr. Sellers has just completed some preliminary tests designed to demonstrate the performance of the Sellers grinder. The results of this test are given in table 1. The Sellers machine is a wet grinder and grinds on the periphery of the wheel with a vertical oscillating movement of the work and a horizontal oscillating movement of the wheel.

According to the figures in table 1, the Sellers grinder removed from 30 to 180 times as much material per minute as is customary. Wheel wear, an important consideration in grinding these tools, is much lower than usual.

Just to show the importance of fast metal removal, with cemented-carbide weighing about 240 gm. per cu. in., one gram represents a layer only 0.0042 in. thick on the face of a 1 in. cube. Thus 5 grams per minute is only about 0.02 in., while 0.09 grams per minute is about 0.0004 in., or just a lapping cut.

Among other things this test emphasized the necessity of proper wheel selection coupled with other essential factors such as cooling, feed pressure, rate of feed, etc. It is expected that the formal tests under way at the present time will yield additional information concerning metal removal, the selection of grinding machines and grinding wheels.—Joseph Geschelin.

(1) "Proper Grinding Practice Assures Success of Tungsten-Carbide Tools," by Coleman Sellers, 3rd. AUTOMOTIVE INDUSTRIES, October 17, 1931.

Grinding Cemented Carbide 30 to 180 Times Faster

AS the use of cemented carbide tool materials grows there is a greater need for facts and figures relating to their utilization as well as the best means of servicing. About 18 months ago, Coleman Sellers, 3rd, summed up the results of a survey of grinding practice in the automotive field which was published in the 1931 Production Issue of AUTOMOTIVE INDUSTRIES (1). Among other things he mentioned the importance of the time element, since these hard materials are difficult to grind and take from 20 minutes to an hour or more to finish to the desired form and size.

Since the publication of this article important developments have taken place in the merchandising of cemented carbide tools. First

came a drop in price which made it possible to extend their use more widely; then came the important announcement that the user could buy the material in unfinished blocks which could be tipped and ground in his own tool department.

Table 1

Material	Grams removed per min.	Cu. in. wheel wear per gm.
Carboloy No. 119A.	5.9	0.408
Carboloy 44A	5.335	0.362
Gen. Elec. B	5.771	0.316
Carboloy 55A	13.438	0.228
Gen. Elec. A	11.594	0.22

A REPORT of the U. S. Department of Commerce, Automotive Division, from Batavia, Dutch East Indies, carried the information that a new three-wheeled car of Japanese origin, the Tsubasa, has been placed on the market there. It has a chassis built in Japan to which is fitted a motorcycle engine of American manufacture, and it sells at from \$80 to \$100 less than three other similar types on the market there.

The Forum

No Reason to "Frown"

Editor, AUTOMOTIVE INDUSTRIES:

Referring to the article "French Engineers Frown on Rear Mounted Engines" in the issue of Feb. 18th, I find myself very much at variance with the objections set forth by M. Claveau.

I have seen several of the rear engined cars exhibited by M. Claveau at the Paris Salons and have also seen photographs of his recently developed front wheel driven cars and cannot see where either of these designs meet the requirements of a dynamically sound automobile.

M. Claveau has outlined his several objections to the rear engined car. However, it seems to me that his objections appear to be an excuse for dropping his rear engined design in

favor of the front wheel driven design rather than a criticism of rear engined cars generally.

For example, I am enclosing a longitudinal section of a 105 in. wheelbase car (see accompanying illustration) which I think overcomes the claimed disadvantage of a much reduced habitable space for a given length of wheelbase. Moreover, that portion of the wheelbase which is used for installation of the powerplant, transmission, etc., is really very small (compared with the Claveau rear engined design it represents a reduction of over two feet). The body shown furthermore, has ample carrying capacity for six adult persons, while the body length compares directly with bodies on conventional chassis of 107 and 109 in. wheelbases.

The forward passenger compartment in this design must of necessity be placed some distance to the rear of the front axle in order to permit the front wheels to clear the sloping floor boards when the wheels are being steered at extreme angles. This arrangement, on the other hand, permits the incorporation of ample space at the front for the carrying of luggage, spare tire and fuel tank, all completely housed in a manner providing a pleasing exterior appearance.

Controls for a rear engined car need not be as complex as M. Claveau might lead one to believe, just because the engine and transmissions are a few feet further away from the instrument panel and driver. I agree that should one use pull rods, shifter rods, bell cranks and a multiplicity of levers, the design might present many difficulties in assembly as well as service, but who would use such controls when there are available excellent push-pull cables, remote control in-

struments and electrically controlled starters?

In addition to the point that location of the engine at the rear enables a more efficient streamlining than is possible with either a conventional or front wheel driven car, the rear engined design may have many technical advantages which cannot be approached in either the conventional or front wheel design.

Some of these are:

1. Over-all weight distribution which approaches the ideal for maximum braking efficiency, and which will decrease skidding tendency by increasing driving wheel traction.
2. A mass distribution which will materially improve the riding quality possibilities of the car.
3. More head room with lower center of gravity.
4. Engine noise, odor, heat and vibration removed as far as possible from the passengers.
5. Lighter steering with more safety than in present day cars.
6. Excellent engine accessibility.
7. Better road visibility.

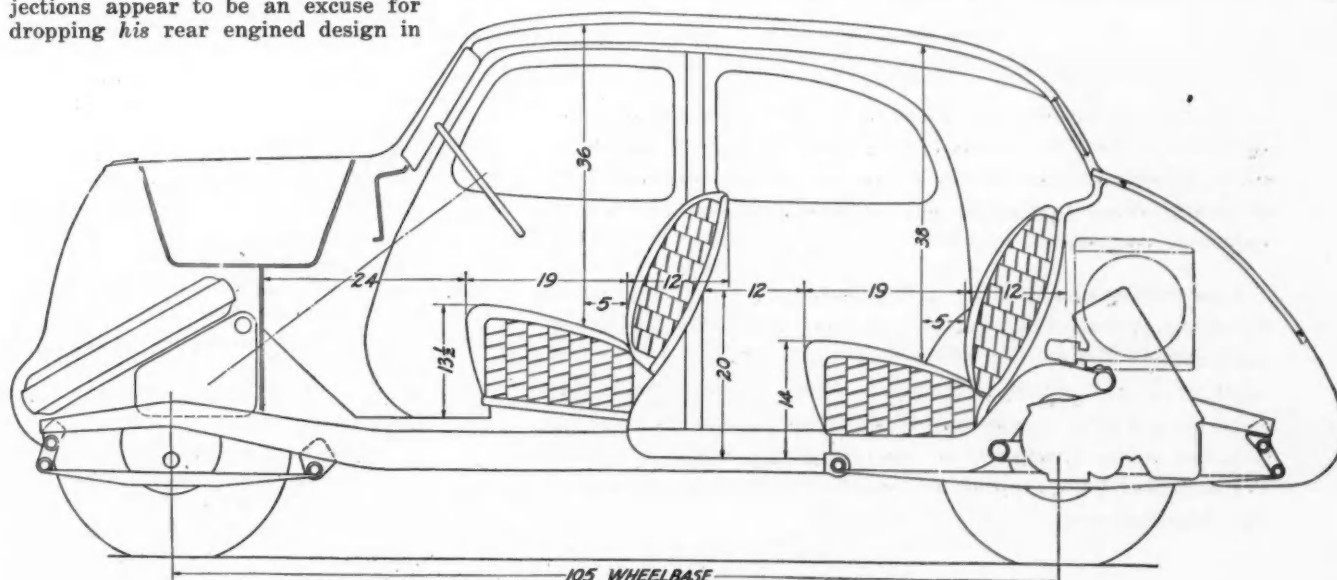
Very truly yours,
 ROSCOE C. HOFFMAN,
 Consulting Engineer.

Wage Cuts—What Then?

To the Editor:

Interesting articles during the past few months appearing in the trade papers and magazines show a distinct trend and constructive approach to a solution of the question so often asked

(Turn to page 409, please)



Legroom in this 105-in. rear engine design compares well with that available in conventional cars of equivalent wheelbase

Alcohol Mixing Motorists Pay for

by Joseph Geschelin

Engineering Editor,
Automotive Industries

GASOLINE prices may be increased as much as two to three cents per gallon if alcohol additions are made mandatory through State or Federal legislation.

According to reports this week, the latest move on the part of farm groups is to ask for legislation making mandatory the addition of 2 to 3 per cent alcohol instead of 10 per cent. This is seen as a concession to the body of opinion marshalled to prove the impracticability of 10 per cent additions either on a local or national basis.

Certainly the 2 to 3 per cent addition is the more practical proposal if we consider the availability of "cash" corn. But from the point of view of the motorist, it will still hold the threat of a rise in fuel price because corn is expected to go to 60 cents at the minimum.

Measures designed to make mandatory 10 per cent additions of alcohol in motor fuel have been offered to the legislatures of a number of Western states. In Iowa, a spectacular battle to the finish based upon the virtues of this move so far as the farmer is concerned ended in the defeat of two bills, Senate file No. 227 and Senate file

No. 231, which would set up state controlled alcohol distilleries and make mandatory the addition of 10 per cent alcohol in motor fuel sold within the state.

According to a news dispatch in the *New York Times*, Feb. 25, 1933, the new Federal administration is seriously considering the use of surplus farm crops for the production of alcohol as a farm relief measure. Before the close of the last lame duck Congress, Representatives Hull and Hall, of Illinois, presented two bills, H. R. 14627 and H. R. 14628 requiring 10 per cent alcohol in motor fuels as a means of gaining this objective. The proposals died in

the rush of more imperative business.

It is felt by students of the situation that the defeat of the Iowa bills may shift the activity from state capitals to Congress in an effort to secure a uniform National code with nation-wide enforcement. It is thought probable that the next session of Congress following the special session will see some proposals to this end.

Let us consider the economic aspects first. At the public hearing before the Iowa State Legislature on Feb. 21, 1933, L. S. Bachrach, of New York, consultant on alcohol manufacture, presented table 1 to show the cost to the farmer if the State bill were put into effect. Instead of getting relief, the Iowa farmers would increase the cost of operating their tractors, trucks, and passenger cars by the amounts given in this table. And would only break even if and when corn hit 75 cents.

Mr. Bachrach estimates that the added cost of gasoline-alcohol mixture (10 per cent alcohol without blending agents) would be 2¼ cents per gallon with 25 cent corn; 3 cents with 50 cent corn; and 3 3/5 cents with 75 cent corn. This is the bare cost of manufacturing alcohol and does not include any charges for blending with gasoline, distributing, etc.

Taking the national picture, domestic consumption of gasoline was about 16 billion gallons, averaging 1931 and 1932 figures. If 10 per cent alcohol were required, we should need at least 1.6 billion gallons of alcohol to meet the demand. Assuming a yield of 2.5 gallons of alcohol per bushel of corn, the new

No business appreciates more fully the desperate plight of agriculture than the automotive industry because of the direct effect of farm price deflation on its sales. Any sound effort to restore agricultural purchasing power consequently can count on the industry's sympathetic support.

Current proposals to raise corn prices by requiring that alcohol be mixed with gasoline, however, do not appear to be economically sound. The solution of the farm problem lies not in forceful substitution of agricultural products where non-agricultural products serve better as a means of absorbing surplus farm production, but in the adjustment of farm output to available markets. The alcohol mixing proposals are expedients which will not encourage this adjustment.

Bills Would Make Corn Price Rise

Even Two and Three Per Cent Additions Now Proposed Would Make Resulting Fuel Cost More Than Gasoline

market would demand 640 million bushels. If additions of three per cent were required, 480 million gallons would be required. This would absorb 200 million bushels of corn.

According to estimates made by the U. S. Industrial Alcohol Co., the production of corn runs around 2¾ billion bushels per year; wheat, about 750 million bushels. But the fact of the matter is that only 12 to 15 per cent of the crop is "cash" corn, the rest being sold as bacon, pork chops, mutton, and other delicacies.

So we find that under normal circumstances only about 400 million bushels of corn get to the "cash" market. Yet the 10 per cent proposals would divert 640 million bushels to an entirely new channel.

Of course the real move behind this legislation is to boost the price of corn to a figure which would net the farmer a reasonable profit. That's farm relief. Whether it is sound and economical so far as the entire population is concerned, is another matter. For in the final analysis, the motorist, and he includes practically all the farmers, will have to dig somewhere to pay an additional load of at least two cents per gallon of fuel.

One suggestion that may be made to Congress is a proposal that might result in pegging corn to say 60 cents. This would be accomplished by the diversion of say 150 to 200 million bushels of corn from the

normal market of 400 million. Of course, no one guarantees that corn will stay at 60 cents or at any other figure, but that's another story.

Now 200 million bushels of corn will produce 500 million gallons of alcohol and if we divide this number by 16 billion, the gasoline consumption, we get a figure of about 3 per cent. Therefore it is argued that what Congress should do is to call for a 3 per cent addition of alcohol instead of 10 per cent.

A prominent alcohol technologist estimated for us that corn at 60

cents would yield alcohol at 40 to 45 cents per gallon. With a 3 per cent mixture, this would increase fuel cost from 1.2 to 1.4 cents per gallon assuming no extra charges for distribution and blending.

Whether motorists can shoulder this added burden in the interest of National economy is a matter of speculation. Falling registrations and the drop in fuel consumption do not augur the full estimated revenue from this form of taxation.

When technical aspects are considered there seems to be some confusion. In fact we have it on good authority that these matters are being given immediate attention so that the petroleum refiners may be in a sound position to advise the legislators.

It is claimed on good authority that gasoline-alcohol mixtures are unstable and tend to separate in cold weather and in the presence of water. The current issue of *The Lamp*, a publication of the Standard Oil Co. of New Jersey, mentions the necessity of using expensive blending agents to stabilize gasoline-alcohol mixtures. This appears to be corroborated by a number of petroleum technologists who are giving the matter their attention. If a blending agent is needed, the cost of the mixture would be well nigh prohibitive.

Table 1

Price of Corn on Farms	25c	50c	75c
Iowa Farmers Receive Per Year	\$2,100,000	\$4,200,000	\$6,300,000
Iowa Farmers Pay Excess on Motor Fuel Per Year	4,200,000	5,250,000	6,300,000
Farmers Lose Per Year	2,100,000	1,050,000
Cost of Experiment to State	8,400,000	10,500,000	12,600,000

On the other hand, a technologist of the U. S. Industrial Alcohol Co., one of the largest producers in this country, says that anhydrous alcohol may be readily mixed with gasoline in any proportions. Moreover, he states that on the basis of their experience, and they make a lot of anhydrous alcohol, the anhydrous material has no more tendency to absorb moisture than does 95 per cent alcohol. Incidentally, while there is much talk concerning the effect of water upon the separation of the mixture, no one seems to know how much water is required to do the damage. This expert feels safe in saying the amount of water collected in the fuel system of a vehicle in normal operation would not be sufficient to be any factor in the situation.

In a paper read before the Chemists' Club, New York, on Sept. 30, 1925, M. C. Whitaker said in part that anhydrous alcohol (99 to 100 per cent) would mix with gasoline in all proportions. He quoted long

service tests of various types of motor vehicles burning gasoline-alcohol mixtures satisfactorily.

Serious technical objections to the use of alcohol in motor fuels were voiced by Dr. G. G. Brown, of the University of Michigan. Among other things he said:

"Miles obtained from a gallon of motor fuel will be decreased about 4 per cent for every 10 per cent of alcohol contained in the blend.

"Technical difficulties in prospect include dissolving the protecting shellac on cork floats in carburetors and gasoline gauges, stoppage of fuel lines and carburetor screens by scale removed by the alcohol from metal surfaces; corrosion of moving parts of engines.

"On account of the instability of alcohol blends when even small amounts of water are present great difficulty and expense is caused in storing and handling alcohol blends because the alcohol so readily separates from the gasoline. Separation of alcohol and gasoline in storage tanks causes service stations to give out unsatisfactory fuels. Blending agents do not eliminate the practical difficulties, and the only available blending agents can

only be manufactured by patented process with permission of the patent owners and with payment of royalty to them.

"Use of alcohol blends in foreign countries is possible only because of much higher prices for motor fuels and subsidy of the alcohol industry in such countries for nationalistic and war purposes to enable it to compete with imported petroleum. The public in such countries prefers straight gasoline and uses every possible opportunity to substitute it for the alcohol blend.

"The proposal to convert corn into alcohol in order to burn it as liquid fuel involves greater financial loss to the farmer and the taxpayer in general than if the corn should be purchased and burned in the fields."

Proponents of the program have claimed that improvement of motor fuel due to the addition of alcohol will justify the increased expense. And it is generally admitted that the addition of alcohol does tend to improve the anti-knock characteristics of straight gasoline. However, one outstanding research man told us that it is necessary to
(Turn to page 408, please)

Extent of Alcohol's Use as Motor Fuel

(In barrels of 42 U. S. gallons)

(No Alcohol Used in Countries not Listed)

Countries	Year	Gasoline	Motor Kerosene	Gas and Diesel Oils	Alcohol (for motor fuels)	Benzol (for motor fuel)	Blended fuels
Argentina*	1930	5,785,000	459,000	835,000	†	None	None
Australia*	1930	6,428,000	676,000	772,000	5,700	23,000	83,400
Brazil	1931	1,822,000	†764,000	**	**	None	**
China	1930	711,400	†442,000	**	3,500	4,800	**
Cuba	1931	**	**	**	**	**	**
Czechoslovakia	1930	1,615,000	108,500	\$232,000	34,000	53,600	**
France	1931	19,381,300	†1,706,400	\$2,221,000	††168,000	396,000	**
Germany	1930	14,687,000	†1,632,000	**	425,000	***2,301,600	**
Hungary	1930	509,400	†514,000	†††223,000	††75,000	17,000	375,000
Italy	1930	3,997,000	†1,405,600	**	†	None	†
Philippines	1931	887,000	†586,300	**	32,500	None	**
Poland	1930	831,300	†1,130,000	**	†	None	†
Sweden	1931	2,779,000	†617,000	**	48,000	None	170,000
United Kingdom	1930	†30,857,000	7,598,000	4,250,000	580	914,000	*2,000,000
Union of South Africa	1931	1,850,000	†350,000	\$6,600	**	None	**

* Estimated.

† Negligible.

† For all purposes.

§ Gas oil only.

** No data.

†† Include 52,000 barrels of aviation gasoline.

†† 1930.

*** 1931.

††† Includes fuel oil.

From The Index, published by The New York Trust Co.

SKIRT WEAR NOT to BLAME

German tests on light alloy pistons show wear of cylinder bores, rings and ring grooves, makes replacement necessary

SOME figures on cylinder wear have been gathered by Elektronmetall Company of Cannstatt-Stuttgart, Germany, manufacturers of Nelson Bohnalite pistons. The figures refer to three models of Adler passenger-car engines, a small four, a six and an eight. Measurements of the cylinders were made on quite a number of cars of each model, and in the drawing reproduced herewith the measurements for the same piston of all like models are reduced to a common mileage of 31,000 and then averaged. The chart shows the distribution of wear along the length of the bore in the direction of the crankshaft axis (full line) and transverse thereto (dashed line), that is in the direction of thrust.

In a publication of the Elektron company which contains a wear diagram of each piston in both directions for all of the engines from which data were obtained, together with the generalized chart here re-

produced, the statement is made that, contrary to general opinion, the renewal of pistons is in reality made necessary not by wear on the piston skirt, but by wear of the cylinder bore, piston rings and ring grooves. (This evidently applies to light-alloy pistons.)

The following conclusions are drawn from the wear measurements by the engineers of the Elektron company:

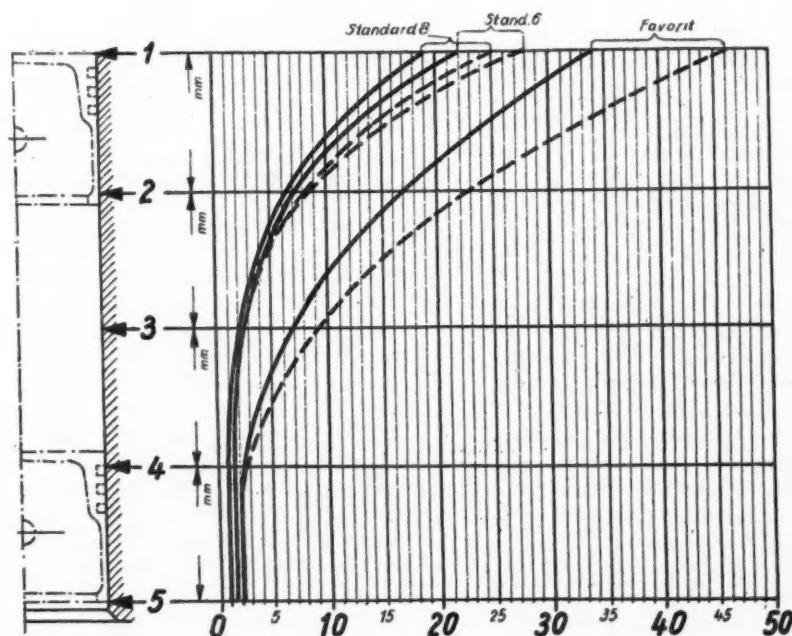
1. The cheaper a car, the longer it is forced over the road without the owner taking notice of possible

excessive oil consumption, unpleasant odors of combustion in the car, and a slight decrease in output. In the case of the Favorit (low-priced car) the average cylinder wear before regrinding amounts to 0.016 in. The owner of a more expensive car becomes dissatisfied when the wear is as much as 0.008 in., which results in light piston slap and possibly a slight drop in output and an increase in oil consumption. He therefore has his cylinders reground when this amount of wear has developed. There is no reason why a car of this type could not be driven, by a less particular owner, until the wear had reached 0.016 in., and thus attain a mileage of 50,000 to 62,000 before overhaul, instead of 38,500.

2. Cars with comparatively small engines do not run as long as those with more powerful engines before an overhaul becomes necessary. This is due to the less favorable relation of engine power to car weight and to the greater number of engine revolutions per mile in the case of the less powerful car. The Favorit has an average mileage of 31,700, the Standard eight of 38,500.

3. In the case of the low-priced car the purchasing department of the manufacturer tries to economize more than otherwise when purchasing the cylinder material, and cost considerations often induce the manufacturer to do without a good air cleaner and oil filter. Further economies are effected by cutting down on the time of "running in" and brake testing.

4. The average performances represented by the chart reproduced herewith are lower than would be



Averaged cylinder wear in three different engine models, in 0.01 mm. per 50,000 Km. Dashed lines show wear across block, full lines lengthwise of block. The scale along the base line is in one-hundredth millimeters; the total scale length corresponds to 0.020 in.

obtained if cylinder wear alone had to be considered. In many cases the car needs some other repair work done, and the owner then is advised to get the cylinders re-ground and the pistons replaced at the same time, even though these might have served for another 5000-10,000 miles.

5. The life of cylinder bores increases from year to year. Five years ago a mean of 18,500 miles was figured with; three years ago, 25,000 miles, and today, 31,000 to 34,000; and in the case of the new 1932 models, 38,000 to 44,000. The average lives which we are able to determine now have reference to cars of the years 1928-30.

6. By replacing the piston rings sufficiently early, as soon as the oil consumption shows an appreciable increase, it would be possible in most cases to obtain a much longer life of cylinder bores and pistons. In most cases the ring grooves after 18,000 miles are still sufficiently good to permit of fitting new rings without machine work on the pistons or the cylinder.

A study of the wear curves shows that there is practically no wear on the lowest one-fourth of the cylinder bore, which is contacted only by the piston skirt, and also that there is comparatively little difference in the wear in the plane in which the pressure of the piston against the cylinder acts, and in a plane at right angles thereto, in which there

is—at least theoretically—no pressure of the piston against the cylinder wall. This would seem to indicate that the principal cause of wear of the cylinder bore is pressure of the piston rings against the cylinder wall. If it were due to pressure of the piston against the cylinder wall then the wear should be very much greater in the plane of piston pressure (full lines) than at right angles thereto. The fact that the wear is greatest at the very top of the bore, where only the top ring contacts, would indicate that the pressure of explosion getting under the rings, and especially under the top ring, is an important factor in cylinder wear. Moreover, since the lubricant has to work its way up from the lower end of the bore and the upper end is exposed to the highest temperature, the lubricating conditions are least favorable at the top end, which further accounts for the greater wear there.

The chart shows the wear along the length of the cylinder bore in millimeters for 50,000 kilometers. In inch units for a mileage of 30,000 the amounts of wear at the top end of the bore figure out as follows: Favorit: Across block, 0.0175 in.; lengthwise of block, 0.0129 in. Standard Six: Across block, 0.0106 in.; lengthwise of block, 0.0084 in. Standard eight: Across block, 0.0095 in.; lengthwise of block, 0.0072 in.

process and the utilization of natural gas, that the saving in crude would have sufficed to produce the gasoline burned the previous year.

In summarizing the situation, we may conclude that legislation making mandatory the addition of alcohol in motor fuel is purely a farm relief measure. As such it is necessary to consider whether it is good business all around to place the entire burden upon the users of the highways. Moreover, it is pertinent to inquire whether the farmer will be the real beneficiary.

Again, the object of this form of farm relief is to peg the price of corn. History shows the impossibility of stabilizing prices by law or by manipulation of supply and demand. Isn't it probable that the price of corn will fluctuate widely from its recent lows to some new highs? If this happens, there can be no stability in motor fuel prices.

The technical problems deserve serious consideration regardless of the economic situation. It would be sheer folly to legislate anything that had no basis in fact. Unless stable mixtures of gasoline and alcohol are possible, it is useless to consider such legislation. Unless stable mixtures can be burned in the 26 million vehicles now on the road, without entailing a vital change in the engine, the legislation has no sound basis in fact.

Alcohol Mixing Bills Would Make Motorists Pay for Corn Price Rise

(Continued from page 406)

add at least 15 per cent alcohol before the mixture is really comparable with the present premium fuels. Ten per cent addition does not produce appreciable improvement; 3 per cent probably will have no other effect than that of raising the price of fuel.

The effect of alcohol on carburetion is a moot question. Some engineers feel that 10 per cent or less should pass unnoticed, although for efficient utilization, it might be advisable to change the carburetor setting, or increase the size of jets on fixed jet carburetors. However, mixtures containing less than 10 per cent alcohol may not require changes of any kind.

Alcohol mixtures in excess of 10 per cent and ranging about 25 per cent do demand serious changes. Stronger mixtures require not only a change in carburetor setting, but may also need higher compression and a change in manifolding. These are not practicable measures in the case of cars already in service.

Nor may alcohol additions be classed as a move to conserve our mineral resources. Petroleum technology has made such remarkable strides in the last few years that the demand for crude has rapidly dropped off. A recent government report indicated that in 1932, the petroleum industry used so much less crude due to improvements in

British Makers Adopt Annual New Model Plan

BRITISH automobile manufacturers have adopted a plan similar to that adopted by the N. A. C. last year with respect to the time of making their annual announcements. Under an agreement between the Society of Motor Manufacturers and Traders and leading car manufacturers, no announcement of a program of passenger car production for the following year is to be made before August 15. This agreement, however, does not prevent manufacturers from announcing new models at any time.

The Forum

(Continued from page 403)
during the past year—"After Wage and Salary Cuts, What Then?"

All existing manufacturers have cut, and cut and cut until it now appears that this method of reducing costs is but part of the way out. It is obvious to the casual observer that further cuts take away buying power with little substantial reduction in cost of the finished product.

We are thinking now in terms of automobiles and trucks and are prompted to these remarks after calling upon the Purchasing Agents of practically all of our large automobile manufacturers during the past two or three weeks.

The following is a cross section taken from a summary of our discussions gathered on the trip. Please note that all interviewed were in one manner or another connected with the Purchasing Departments of their respective companies.

To substantiate his statement that further salary cuts are not the whole way out, one Purchasing Agent said: "You may take my position for instance.

"I had promised my wife a car this fall that she might have for herself and our kiddies. I was about ready to place my order through our Sales Department when, behold, I get a notice of another salary cut. Well, after talking the matter over it was evident that we would be forced to get along without the new car. In other words, my buying power so far as automobiles is concerned, is nil, and there are hundreds just like me who are now definitely out of the market as prospective car buyers."

This question was put to several Purchasing Agents:

"What is your solution, what other method can be used to materially decrease the manufacturing cost of a finished automobile?"

Several Purchasing Agents answered this question in different ways, but to the same point, namely:

"One of the further ways to cut

costs in our plant would be to discontinue or make stand on its own feet our subsidized foundry. We can buy castings today cheaper than our plant can possibly produce them."

In another plant, the Purchasing Agent answered substantially the same way, and unhesitatingly stated:

"Our subsidized forge plant is a millstone around our neck." This Purchasing Agent stated:

"At one time we purchased as much as \$300,000 worth of forgings monthly. During the past five years our forge plant overhead has had to be re-pro-rated over the balance of our plant, and for the past three or four years, we could have bought forgings on the outside for from 1/3 to 40 per cent less than our own actual costs, had the forge plant not been subsidized. The same thing prevails on castings and stampings and in about the same proportions under our own costs.

"Our opinion is that the Purchasing Department should be given authority to buy to best advantage, and if this means buying from specialists on the outside, then this should be permitted and the subsidized departments closed."

In magazines just out today, we note this statement regarding one of the largest automobile manufacturers.

"This company will farm out as much as possible of its parts business, and these new models will contain the smallest percentage of their own make of parts of any car yet offered by this company."

We were interested to know more of the cause for subsidized departments, hence the following cross section of our answers.

Several years ago at a period of rapidly advancing sales of automobiles, vendors of various parts would not, could not or did not, at least, add to their plants sufficient equipment to take care of the rapidly advancing sales of automobiles.

As a result, in order to take care of their requirements for parts, the automobile companies added many new departments to take care of these particular parts, viz.; forgings, castings, stampings. The result is the present day finds them with large investments in plant and equipment which is penny wise but pound foolish to keep operating.

The parts manufacturer on the outside is now better able to take care of the automobile manufacturer, as there is a surplus of capacity in nearly every parts line. Competition has forced these plants to become modernized, and today, with their better equipment, they can produce and deliver parts at a large saving as against the departmental shop.

The automobile manufacturer cannot be taken to task for the large amount of money spent in building up parts departments. It was in many cases the only way he could get the quality and service he required.

Now, however, parts so manufactured can be purchased from the parts manufacturer, the specialist, if you please, cheaper and in most cases, better than they can be made in the departmental shop, with prompt deliveries guaranteed.

The above condition has been true for four or five years, and the feeling has been, of course, that a great deal of money has been spent in the building up of these departments, and as prices have steadily gone down from parts manufacturers on the outside, the automobile manufacturer has, by decreasing the arbitrary overhead on his department from an accounting standpoint only, kept it operating irrespective of the fact that his product in some other departments was being materially increased in cost by the absorbing of the overhead which should rightfully go against the parts department, hence maintaining a subsidized department which has outlived its usefulness and should be written off the books.

In one plant, the Purchasing Agent stated that it had come to a point in the department of finding out just what percentage of overhead the department could operate on and have their costs show no higher than the price of the same article when purchased on the outside. He further stated that a flat percentage or overhead, which in most cases is about one-half its actual overhead, was applied to this department and its accounting was kept on that basis.

The reason some of the larger automobile manufacturers are today going on the outside for their parts, whether they be castings or forgings or sub-assemblies, means that irrespective of the money invested in their subsidized departments, they have taken advantage of the saving to be made by buying where it can be done to the best advantage.

Today, after all other apparent cuts have been made and the goal not reached, these manufacturers are looking carefully into these departments, which in most cases have earned their retirement years ago.

One manufacturer stated that he knew these departments were absolutely necessary years ago and once kept their total costs down. Today, in his opinion, these same departments are keeping costs up.

When the adopted departments were built years ago, the manufacturers undoubtedly used good judgment. These departments have now outlived their usefulness and are costly burdens on the manufacturers who continue to operate them.

Today, the manufacturer who is willing to face the facts and abandon these departments is surely taking a step forward in line with the modern trend of cutting costs and increasing manufacturing efficiency.

These subsidized departments, it appears, are on their way out, and rightly so.

A WORKS MANAGER.

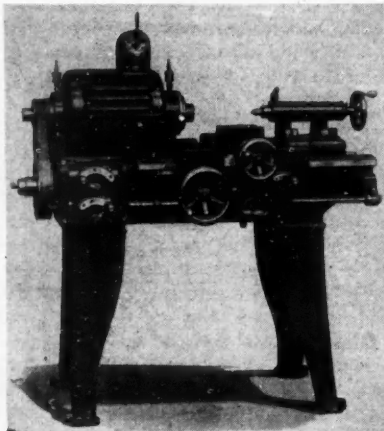
NEW DEVELOPMENTS

Automotive Parts, Accessories and Production Tools

LeBlond High Speed Lathe

An 11 in. high speed production lathe designed to utilize cemented-carbide tooling is announced by the R. K. LeBlond Machine Tool Co., Cincinnati, Ohio. It provides nine feed changes and is especially recommended for turning small shafts and for such materials as bronze, bakelite, babbitt, aluminum, and white metals.

The multi-speed motor armature is mounted on the spindle which rotates on precision ball bearings. The head is said to be designed so rigidly that the spindle can be brought up to a top speed of 3600 r.p.m. and stopped five times per minute. The spindle can be brought to top speed in two



seconds and stopped in $1\frac{1}{2}$ seconds.

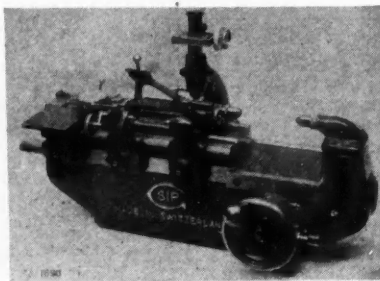
The bed is of heavy design; the rear carriage bearing is flat; the front way is an improved "compensating V" construction which resists the tool pressure in all directions and increases the rigidity. Bath bed and carriage are nickel steel castings of fine grain, wear resisting structure.

The apron is of one piece box section construction in which all of the bearing brackets are cast integral. All of the shafts and studs are supported on both ends, thus insuring accurate alignment of the gears.

Societe Genevoise Machine For Checking Working Gages

The Société Genevoise through their American agents, the R. Y. Ferner

Co., Washington, D. C., are placing on the market a machine designed especially for the accurate and rapid checking of working gages, such as plug gages, thread gages, snap, gap and profile gages, and disk and rec-



tangular gages up to 4 in. in size. It also has an attachment for the measurement of the pitch of taps and thread gages. Such gages which are generally used in applying tolerances of 0.0002 in. to 0.0005 in. can be checked on this machine to an accuracy of 0.00005 in.

All measurements are made by direct comparison with a line standard ruled on glass of a special composition having practically the same coefficient of expansion as steel. Readings are made by a micrometer microscope direct to $1/20000$ in. per division. Contacts with the piece being measured are made by optically flat synthetic sapphire surfaces and under a constant pressure. Two special tables, supported on steel balls, for holding pieces being tested, are furnished. One of these carries center points for support of plug and thread gages for measurement of their different diameters.

Monarch Centrode Lathe Attachment

Following a long period of development incident to the introduction of the Monarch-Keller form-turning machines, the Monarch Machine Tool Co., Sidney, Ohio, has just issued a technical bulletin describing the new Centrode device and its applications. The Centrode device makes it possible to turn, bore and face shapes other than round. Ovals, triangles, squares, hexagons and octagons, and any shape up to sixteen sides, either flat, concave or convex, can now be pro-

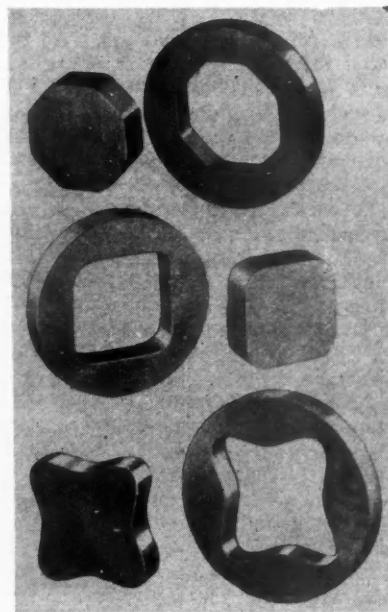
duced. It is applicable to Monarch lathes, model "BB" 23 in. swing or larger and can be applied to new lathes only.

A graduated scale for setting to a predetermined stroke is provided. The stroke capacity ranges from 0 in. to 2 in. An index plate makes it easy to quickly set the number of flutes or tool actuations per revolution of spindle in divisions from 1 to 16. The device is supported on the carriage bridge in the same manner as a compound rest. By means of the cross feed screw, the unit can be positioned for diameters.

The use of the Centrode device is not confined to the Monarch-Keller machine. If the work is straight and without contour but is in such shapes as triangular, square, hexagon, etc. (as prevails in die work) the Centrode device eliminates the unsatisfactory use of expensive cams, springs and weights.

This company also has developed an oval chuck to be used in combination with the Centrode device. When used on a standard lathe, the oval chuck will turn or bore ellipses of varying major and minor axis within the capacity of the chuck. The capacity of this chuck is a 2 in. throw—or a difference of 4 in. between major and minor axis.

The combination of the Centrode and oval chuck on a standard Mon-



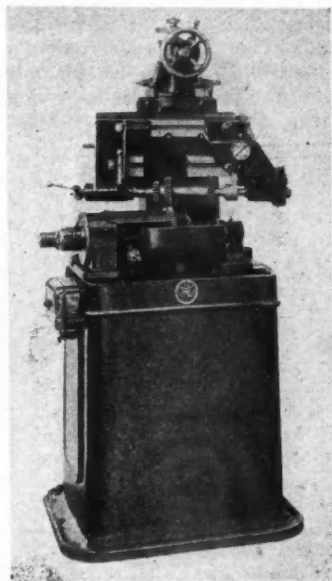
arch lathe will produce innumerable and inconceivable shapes. In combination with the Monarch-Keller automatic form-turning machine, the limit in contours and shapes that can be produced is almost incalculable. Each fraction of an inch change in the stroke setting of the Centrode and each fractional change in the setting of the oval chuck produces a different shape.

NEW DEVELOPMENTS

Automotive Parts, Accessories and Production Tools

Red Ring Lapping Machine

It has heretofore been regarded as impracticable to lap gears where the inaccuracies after heat treatment amounted to more than 0.0005 inches. In cases exceeding this amount grinding was the only alternative. But grinding requires much more time and is relatively expensive. Into this picture has come the Red Ring Lapping Machine by the National Broach and Machine Co., Detroit, Mich. With this machine, the economic limits of lapping have been greatly extended.



The Red Ring Lapping Machine is designed to correct involute curvature, spiral angle, eccentricity and tooth-spacing on all plain spur and helical spur gears used in power transmission, timing and gear reduction sets.

With this type of lapping available, it has been found practicable to omit finish cutting of gears in some instances. In several of the large plants handling gears, transmission units are now cut "once around" on modern hobbing machines. After heat treatment, they are lapped to satisfactory tolerances—the lapping operation requiring only about three minutes per unit. Thus all finishing is done after heat treatment and corrects all fire distortion. Normal practice in these plants is to hob the gears with a feed of 0.060 in. The machine, of course, and the tools are kept in first-class condition.

An example of what may be accomplished in lapping is that of a lot of

17 gear sets having an error in tooth form of 0.004 in., an eccentricity of 0.005 in., and index error of 0.0015 in., an excess tooth thickness of 0.004 in. and a spiral angle which varied 0.005 in. in a 6-inch length. In spite of these rather severe conditions, this job was successfully handled on a Red Ring machine with an average lapping time of from 10 to 15 minutes per unit. The finished gears surpassed in every respect the rigid requirements set by the automobile manufacturer for whom the work was done.

Olsen Hydraulic Testing Machine

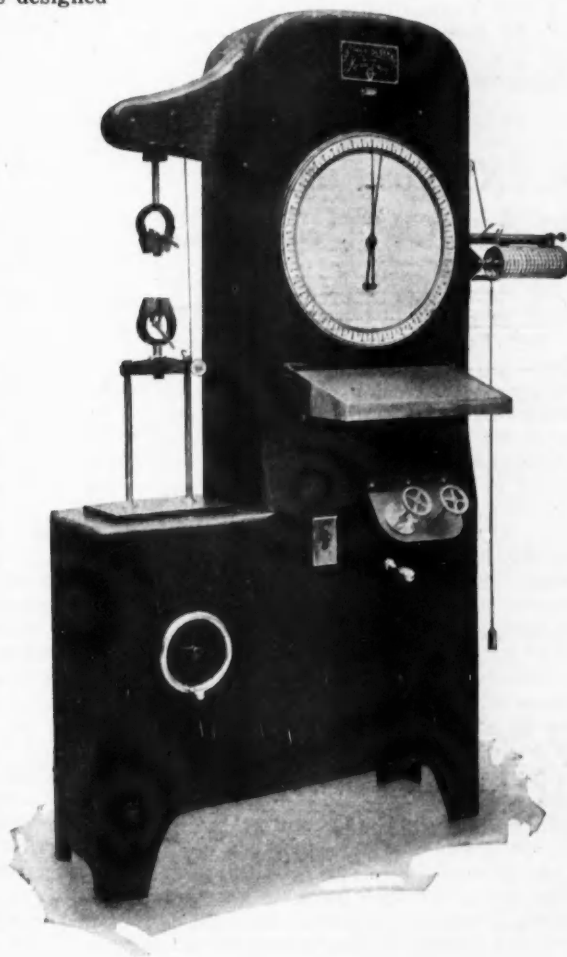
A new hydraulic universal testing machine, with self-indicating pendulum dial, lever-weighing system, and recorder, has been announced by the Tinius Olsen Testing Machine Company of Philadelphia. It is designed primarily for testing fine wire, strip steel, fabrics, etc. This design is built in five sizes to a maximum of 5000-lb. capacity.

Loading may be accomplished either by hydraulic means, as illustrated, or mechanically. Where the hydraulic loading system is used, provision is made for constant speed of testing, regardless of load, up to the capacity of the machine. One valve may be set for any predetermined speed of testing, and remain at that setting during the range of tests. Changes in speed may be accomplished by the use of the second valve without the necessity of disturbing the setting of the first. Return of the pulling head, after rupture of the specimen, is automatic and rapid, and the head returns to its initial position, ready for the test. This feature makes possible production testing on this type of machine. The motor-driven pump, housed in the cabinet, is said to be practically noiseless in operation. It produces over 20,000 impulses per minute and therefore reduces pulsa-

tion to a minimum. Various lengths of specimens from 0 to 10 in. may be tested and adjustment is secured by the hand-wheel at the lower left-hand side of the machine. In the hydraulically-loaded machine the travel of the pulling head is 4 in. Provisions are made to prevent over-travel and over-loading.

The pointer of the pendulum dial makes two revolutions to the indicated capacity, which gives the equivalent of a scale of 36 in. diameter, the actual diameter being 18 in. Scale divisions are uniform over the entire circumference and measure approximately $\frac{1}{8}$ in. This gives very accurate and close readings.

Dual capacity is usually furnished, triple and quadruple capacity being furnished at additional cost. A special feature of the machine is the method employed for changing the capacity. In doing this, it is not necessary, in a dual-capacity machine, to remove any weights from or change the length of the pendulum. All that is required is to change a plug from one station to another. Differently graduated dial rings can be furnished for different capacities within the range of the machine, and are readily interchangeable. A maximum hand is provided, which always indicates the maximum load which has been applied to the specimen during the test. The weighing system is absolutely independent of the straining system.



Engineering Congress to Be Staged by S. A. E.

Summer and Other Important Meetings to Be Combined in Late Summer Chicago Event

NEW YORK—The International Automotive Engineering Congress of the Society of Automotive Engineers will be held at the Palmer House, in Chicago, August 28 to September 4 inclusive, according to a statement issued today by John A. C. Warner, General Manager of the Society of Automotive Engineers.

Held concurrently with the Century of Progress Exposition, the International Air Meet, the Gordon Bennett Trophy Race and other events of world-wide interest, the International Automotive Engineering Congress will include a wealth of technical sessions, committee meetings, exhibits, demonstrations and social gatherings that will profit by a distinctly international scope and flavor.

The Congress will in reality be a combination of a number of important meetings, including the annual Summer Meeting, representative of all technical phases of S. A. E. activity. In addition to the purely technical sessions, several features of a general and popular character are being planned; included among these are a banquet and various events of like nature.

Alex Taub, Chevrolet, is Chairman of the Meetings Committee in charge of the staging of the International Automotive Engineering Congress.

R. F. C. Loan to Free Half of Old Deposits

Treasury Assurances Quiet Ruthless Liquidation Fears

DETROIT—Sporadic attempts during the past few weeks to prevent definite total closing of the old major banks of Detroit have been dropped with the recognition that the Federal Administrations would not permit them to reopen under any condition. It is expected that the R.F.C. loan to the First National and Guardian banks would be made within another week liberating a total of approximately fifty per cent of total deposits, including the ten per cent already paid out.

Smaller industrial automotive concerns will undoubtedly remain hard hit by the tying up of working capital, but have some reason for optimism in that it is expected that the offset stipulation in the National Banking law will be leniently applied to prevent failure of concerns.

Announcement from Washington that an additional loan to the old banks totaling approximately 2-2½ per cent of deposits has been approved,

will make it possible to distribute stock in the so-called G.M. bank on the basis of proportion of former deposits, a plan which both Mr. Sloan and Mr. Hutchinson of the Chrysler Corp. had been favoring since the first negotiations. Legal technicalities prevent the actual setting up of such distribution, but the R.F.C. action has evidently made it possible.

Deposits in the new National Bank of Detroit have mounted steadily during the week. Deposit No. 1 was \$1,000,000 by M. L. Prentiss, treasurer of the General Motors Corp. Other large deposits include \$4,000,000 from Chrysler and \$2,000,000 from G.M.-A.C. Assurances have been received from the Secretary of the Treasury that no ruthless liquidation of the assets of the old banks is contemplated and that every consideration will be shown to their borrowers and depositors. The Secretary said further that good notes will be transferred to the new bank.

Overland Program Still Incomplete

Audit Shows Net Worth of \$27,621,115—I.H.C. Truck Output Expanding

TOLEDO.—Although reorganization plans are still incomplete, the week witnessed a number of developments of importance in the Willys-Overland receivership.

Sir William Letts, managing director of Willys-Overland Crossley, Ltd., England, and T. A. Russell, president of Willys-Overland, Ltd., of Canada, were in New York conferring with John Willys presumably on reorganization plans.

Recommendations were made that the company's common and preferred stock be removed from the New York Stock Exchange list.

In a hearing on a petition by workers for unpaid wages of \$316,000 requesting that their wages be made a preferred claim and that assets or receivers' certificates should be sold to pay the claim immediately, L. A. Miller revealed that the plant is employing 1000 men and turning out 75 trucks daily for I. H. C.. It is planned to step production up to 125 daily and employment to 1500 this week.

The truck job is being financed by \$265,000 of receivers' certificates purchased by I. H. C. and which are redeemed by delivery of the trucks. Mr. Miller stated also that I. H. C. is studying operations to ascertain how output might be continued if the receivers were obliged to sell the dies. If Overland cannot continue production, manufacture will be transferred to the Fort Wayne or Springfield plants of the Harvester company. Decision as to whether Overland will

(Turn to page 420, please)

NEW

Graham Resigns As Rockne Sales Head

Studebaker Absorbs Sales Activities of Subsidiary

DETROIT—George M. Graham, vice-president in charge of sales of Rockne Motors Corp. since its inception, has resigned. His resignation completes the fusion of Rockne sales activities with those of Studebaker Sales Corp. in South Bend, which began early this year. Rockne sales op-



George M. Graham

erations in the field as well as at headquarters have been combined with Studebaker.

F. L. Wiethoff, sales manager of Rockne, also has resigned.

Reports current here indicate that the transfer of Rockne manufacturing operations to South Bend also is contemplated.

Mr. Graham is one of the best-known figures in the industry, having represented the industry in numerous tax battles at Washington. During his career he has been vice-president of Willys-Overland, Chandler and Pierce-Arrow.

WS

Dealer New Car Stocks the Barometer as Industry Increases Schedules for April

Retail Sales Back at Pre-Holiday Levels as Normal Seasonal Influences Start to Become Effective—Conservative Attitude Continues

February Car Sales Estimated at 67,300

PHILADELPHIA — February registrations of new passenger cars in the United States amounted to about 67,300, against 83,000 a year ago and approximately 80,000 in January of this year, according to estimates based on returns from 38 States. The decline from February of 1932 amounts to about 19 per cent, and from January, 1933, to 16 per cent.

On the basis of these partial returns Chevrolet leads the field with 24,600; Ford second with 10,400 and Plymouth third with 8000 new car registrations. As compared with February, 1932, Chevrolet shows a decline of approximately 14 per cent, Ford a gain of 9 per cent and Plymouth a substantial gain of 84 per cent.

Estimated on the basis of returns from 25 States, truck registrations in February will be about 9700 units, a decline from last year of about 34 per cent. The indicated combined registrations on new cars and trucks in February amounted to 77,000 units.

DETROIT — Passenger car sales which during the second 10-days of March recovered sharply from the low levels reached during the bank holiday, continued their gain during the week ending March 25, at which time they had reached levels approximately equal to those existing before the holiday went into effect. From such sales figures as are available, estimates indicate that March retail volume will not show a seasonal increase over January and February.

Car manufacturers are maintaining a conservative attitude with respect to the increase in sales experienced since the termination of the bank holiday. The general belief is that the business lost the first part of the month will not be regained in the form of excessive sales for a brief period of time and a subsequent dropping back to a more normal sales curve. The sales curve at present seems to be rapidly approaching a normal type with routine seasonal increase in business.

Production of passenger cars was held to low levels during the closing weeks of March and in many cases are below actual retail sales for the month. While April schedules will be stepped up in conformance with expected normal increases in retail sales, they will remain at unusually low levels. The experience of last year when many automobile plants were virtually idle from June on, is something that car manufacturers don't want to see repeated. Building up of new car stocks in dealers' hands is being carefully avoided so as to insure continuance of production be-

yond mid-summer and still be assured of low new car stocks at the end of the year.

Sales executives admit however, of the possibility of an extension of the normal seasonal increase later in the year as a result of noted increases in general business. An interesting development in this respect is that retail sales in Canada and a number of important lines have been running consistently five to ten per cent higher than last year. Canadian sales of course, did not feel the effect of the domestic bank holiday.

Pontiac Sales Show Big Post Holiday Increase

DETROIT.—During the second 10-day period of March retail sales of Pontiac cars showed an increase of 70 per cent over the first 10-day period, according to R. K. White, sales manager for Pontiac.

"A further cheerful fact is that our dealers are ordering cars at the rate of 250 per day," Mr. White said.

March Output About 90,000

DETROIT—A total production in March of approximately 90,000 is indicated by data available at this time. This compares with 110,000 in February and 123,000 a year ago. The unseasonal decrease is, of course, due to the banking holiday. In the closing days of the month, output rate appears to have been in excess of 4000 units weekly.

February Production Down 17.5 Per Cent from January and 10.3 Per Cent from Last Year

WASHINGTON, D. C.—February production of motor vehicles in the United States and Canada totaled 110,112, as compared with 133,472 in January and 122,895 in February, 1932. The respective percentage decreases are 17.5 and 10.3.

Corrected for seasonal, February output was 35 per cent of the monthly average of the last eight years, against 51 per cent in January and 39 per cent in February, last year.

Detail Bureau of Census figures follow:

		UNITED STATES			CANADA		
		Passenger Cars	Trucks	Taxicabs (1)	Passenger Cars	Trucks	
1932	Total						
January	119,344	98,706	20,541	97	3,731	3,112	619
February	117,418	94,085	23,308	25	5,477	4,494	983
Total (2 mos.)	236,762	192,791	43,849	122	9,208	7,606	1,602
1933							
January	130,114	108,892	21,717	5	3,358	2,921	437
February	106,814	91,340	15,322	152	3,298	3,025	273
Total (2 mos.)	236,928	199,732	37,039	157	6,656	5,946	710

Graham Gains

DETROIT, April 3—Retail deliveries of Graham sixes and eights for the week ending March 25, showed a 40 per cent gain over those of the previous week, according to a compilation of reports from all sections of the country, according to R. C. Graham, vice-president. The daily production average established prior to the bank crisis is being exceeded at present, Mr. Graham said.

Buick Sales Better

DETROIT—W. F. Hufstader, Buick sales manager has reported that during the first ten days of March Buick dealers delivered 573 new cars and during the second ten days deliveries totaled 902, an increase of 57 per cent.

Commerce Bureau Cut Opposed by Exporters

**Say Costs Can Be Reduced
But Insist Foreign Trade
Service a Vital Need Now**

WASHINGTON, D. C.—Drastic reorganization of the Bureau of Foreign and Domestic Commerce involving a 50 per cent reduction in its budgets and the elimination of the commodity divisions including the automotive, is planned by the new administrations, according to reports current here. Although nothing has been said officially, it is believed quite generally that the plan contemplates a substantial curtailment of the Bureau's activities and their consolidation into four divisions, namely: foreign tariffs, regional information, Canadian and Pan-American trade and domestic commerce.

If present forecasts are correct, foreign commercial representatives of various classes will be eliminated except in key countries, and the 20 commodity divisions will be abolished. Domestic officers of the Bureau will be maintained only in Federal Reserve cities according to the reported plan which would mean the closing of offices in about two dozen other cities.

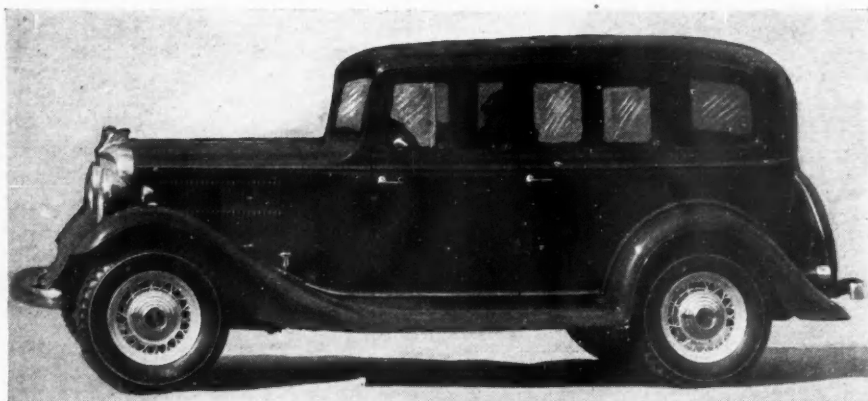
Because of the foreign trade service the Bureau has been rendering the rumored changes involving a sharp curtailment in such service, have aroused considerable opposition. A memorial from a group of export organizations including the Overseas Automotive Clubs says in part:

"We are moved in sending this memorial by the current persistent reports that the Bureau of Foreign and Domestic Commerce will be virtually abolished, in so far as its direct service to American foreign trade is concerned, by having functions transferred to the Department of State and to other sections of the Government.

"While we are in agreement with economies in this Bureau, we are unanimously and emphatically opposed to the destruction of this agency in its present relationship. We believe that there should continue to be a Bureau of Foreign and Domestic Commerce and that that Bureau should continue to be responsible to the Department of Commerce. We believe that it should continue to function, broadly speaking, as the only agency of the Government devoted to trade promotion abroad, and to the dissemination to American business of the facts of foreign commerce.

"We are convinced that the handing over of these duties to any other section of the Government would be tantamount to nullifying so large a part of the service they now provide that the result would not be an economy, but would simply lead to further disorganization, with consequent acceleration of losses now being sustained by American foreign traders."

New Terraplane Six Sedan



The new larger Terraplane Six Sedan equipped with year-round ventilation just introduced by Hudson-Essex

Flanders Is New J. & L. President

SPRINGFIELD, VT.—Ralph E. Flanders has been elected president of the Jones & Lamson Machine Co., to succeed James Hartness, who recently retired. K. H. Woolson takes the office of vice-president. Mr. Flanders joined the company in 1912 as manager of the Fay lathe department. In 1914 he was made general manager, and later vice-president. Mr. Flanders is a past-president of the National Machine Tool Builders' Association, and has served as a manager and a vice-president of the American Society of Mechanical Engineers in addition to membership on several committees. Other connections include membership on the National Screw Thread Commission and the American Engineering Council.

Goodrich Gardens Have Big Yield

AKRON—The story of the co-operative farm plan sponsored by the B. F. Goodrich Co., is told in an interesting pamphlet just published by the company. In 1932, the project provided, over 1,000,000 pounds of vegetables for 900 workers and their families who participated. In return for his efforts, a man who worked one day a week in the gardens during the season received more than one ton of vegetables. Plans are under way to repeat the project this year.

American Cyanamid Gets Mabelite Rights

NEW YORK—The American Cyanamid & Chemical Corp. has secured the exclusive sales rights on all ores, and "Mabelite" pigments manufactured therefrom, mined from the deposits controlled by the Eastern Mabelite Corporation.

The inherent characteristics of "Mabelite" pigments, among which are purity, inertness, opacity, and resistance to destructive agencies, adapts them as especially efficient for the manufacture of protective paints and coatings for metal, concrete and wooden surfaces.

A.S.M.E. Engineering Week

NEW YORK.—Engineering week at the Century of Progress Exposition, Chicago, June 25 to July 1, will be the occasion for the semi-annual meeting of The American Society of Mechanical Engineers, as well as meetings of many other national engineering societies. Plans are being laid for a program of technical and social events that will rival in size and interest one of the society's annual meetings.

Maryland Registrations Drop

BALTIMORE—Maryland registrations of new passenger cars in the second 10 days of March numbered 298 as compared with 399 in the same period last year. Corresponding figures for trucks show a drop from 66 to 45.

Chain Belt Opens Kansas City Branch

MILWAUKEE—The Chain Belt Co. appointed A. S. Kennedy as manager of its new branch office in Kansas City. REX chains and conveyors, both nationally known commodities, were formerly marketed in this territory by the St. Louis office.

For the last five years Mr. Kennedy has been a sales engineer covering the States of Missouri, Kansas and Nebraska, and handling a general line of power transmission, elevating and conveying equipment, and is already well known in this field.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

There has been some increase in business with the approach of spring; but the general business sentiment is still considerably ahead of actual performance. Trade statistics that are now appearing reflect, of course, the adverse influences of the banking holiday. However, the current business set-up is conservatively encouraging.

The Guaranty Trust Company's preliminary index of business activity for February stands at 55.7, as against 55.2 for the preceding month and 65.6 a year ago. The Company's index of wholesale commodity prices on March 15 was 35.3, as against 33.0 a month earlier and 40.5 a year earlier.

Freight Loading Jumps

Railway freight loadings during the week ended March 18 totaled 449,712 cars, which marks an increase of 11,889 cars above those during the preceding week, but a decrease of 135,047 cars below those a year ago and a decrease of 291,541 cars below those two years ago.

Insurance

Sales of ordinary life insurance in the United States during February were 23 per cent. below those a year ago, and total sales during the last twelve months were also 23 per cent. below those during the twelve months preceding.

Foreign Trade

Merchandise exports from the United States during February totaled \$100,000,000, as against \$153,972,000 a year ago, while imports amounted to \$83,000,000, as against \$130,999,000.

Power Production

Production of electricity by the electric light and power industry in the United States during the week ended March 18 was 10.6 per cent. below that

a year ago, while the decline in the preceding week was 9.6 per cent below a year ago.

Cotton Production Up

Cotton spinning spindles in place at the end of February totaled 31,088,382, of which 23,659,100 were operated at some time during the month, as against 23,766,968 during the preceding month and 25,190,276 a year ago.

Fisher's Index

Professor Fisher's index of wholesale commodity prices for the week ended March 25 stood at 56.6, as against 56.1 the week before and 55.0 three weeks before.

Stock and Commodity Prices Fluctuate

After the sharp rise during the preceding week, the stock market declined last week. During the early part of the period the declines were sharp, but some of the losses were subsequently regained. Fluctuations on the commodity markets were of little consequence, although wheat reacted from the rise in the preceding week. The volume of transactions on the stock market was small, surpassing a million shares on only one day. Most issues showed net losses for the week.

Federal Reserve Statement

The consolidated statement of the Federal Reserve banks for the week ended March 22 showed declines of \$561,000,000 in holdings of discounted bills, of \$51,000,000 in holdings of bills bought in the open market and of \$35,000,000 in holdings of Government securities. The reserve ratio on March 22 was 55.5, as against 49.1 the week before and 45.6 two weeks before.

Bachman Heads New S.A.E. Brake Group

NEW YORK—The S. A. E. Council has appointed a Brake Committee, with B. B. Bachman of Autocar as chairman, to develop technical information for the use of an N. A. C. C. committee headed by D. G. Roos of Studebaker which latter committee



B. B. Bachman

is working with state motor vehicle authorities. Mr. Roos is also a member of the S. A. E. committee. Other members appointed by the Council include H. C. Dickinson, Bureau of Standards; A. F. Coleman, Socony-Vacuum; and F. K. Glynn, American Telephone and Telegraph Co.

Eisemann 1932 Statement

NEW YORK—Eisemann Magneto Corp. reports net loss of \$203,875 for 1932 against a net loss of \$97,841 in 1931. Comparative data from the balance sheet follow:

	1932	1931
Cash	\$133,218	\$204,188
Current assets...	914,745	1,115,484
Current liabilities	14,326	12,120
Working capital..	900,419	1,103,364

Murray Reports Deficit in 1932

DETROIT—Murray Corp. of America and subsidiaries has reported for year ended Dec. 31, 1932, net loss of \$1,880,835 after depreciation, interest, etc., but before dividends amounting to \$15,752 on preferred stock of the J. W. Murray Mfg. Co., compared with net loss of \$1,241,583 in 1931.

Current assets as of Dec. 31, 1932 amounted to \$5,882,517 and current liabilities \$581,061 against current assets of \$7,287,659 and current liabilities of \$872,739 in the previous year. Working capital at the year end was \$5,301,456, including \$2,964,886 cash, against \$6,414,920 a year earlier.

February Aircraft Exports

WASHINGTON, D. C.—Aircraft exports in February totaled 41 planes valued at \$493,748, according to preliminary figures of the Department of Commerce. Foreign shipments of engines number 34 valued at \$150,250.

Robert S. McClintic

FLINT, MICH.—Robert S. McClintic, 27 years old, former engineer in the chassis division of Buick Motor Co., died of exhaustion last Monday during a snow-shoe trip through the wilds of northern Michigan.

Report on Extreme Pressure Research

S.A.E. Sub-Committee Has Difficulty in Obtaining Comparable Test Results

NEW YORK, N. Y.—A first report has been made on the research work carried out at the Bureau of Standards for the Lubricants Research Subcommittee of the S. A. E. Research Committee on the subject of extreme-pressure lubricants. The Lubricants Research Subcommittee comprises six groups of members, viz., an automobile group, an axle and transmission group, a bearing group, an oils group, and operators' group and a truck group, each with its own chairman. Col. H. W. Alden of the Timken-Detroit Axle Company is chairman of the committee as a whole, and Dr. H. C. Dickinson, of the Bureau of Standards, secretary. The research work has been financed by contributions of oil refiners and automobile and parts manufacturers.

In the report referred to, which is in the form of a paper entitled "The Load-Carrying Capacity of Extreme-Pressure Lubricants," by S. A. McKee, E. A. Harrington, and T. R. McKee, tests on nine different lubricants in four different lubricant testing machines are described and the following conclusions are reached:

(1) The four lubricant-testing machines, when operated as recommended by the manufacturers, do not rate the lubricants in the same order. No set of operating conditions has been found under which all of the machines will rate all of the lubricants in the same order.

(2) The load-carrying capacity of an extreme-pressure lubricant tends to decrease as the temperature increases.

(3) The load-carrying capacity of an extreme-pressure lubricant tends to decrease as the rubbing speed increases.

(4) The effects of speed and temperature differ with the particular lubricant and machine involved to such an extent that even the order of rating may be changed.

(5) The ratio of the applied load to the actual pressure changes rapidly on running with each of the four machines, which throws serious doubts on comparability of the data.

Waukesha Gets Brewery Order

WAUKESHA, Wis.—The Waukesha Motor Co. booked orders for 800 engines during the week of March 20-25, about 100 being accounted for by brewery trucks. The volume of the week's orders ranged upwards of \$250,000. Two hundred engines are for export to France for industrial plants. A similar number will go into

agricultural trucks and about 20 in agricultural tractors. Ingersoll-Rand bought a substantial quantity for air compressors, etc. Additional orders for brewery truck engines are to be released as soon as the state legislature sets up regulations for the marketing and distribution of beer. Waukesha Motor, recently running at 18 per cent of capacity, is now up to 25 per cent and will recall more employees shortly.

Timken Axle Statement

DETROIT.—Timken-Detroit Axle Company has reported for year ended Dec. 31, 1932, net loss of \$1,193,873, after depreciation, taxes and special reserves for accounts receivable and inventory contingencies amounting to \$200,000. This compares with net profit of \$328,328 for the year 1931.

Current assets as of Dec. 31, 1932, amounted to \$6,939,595 and current liabilities \$262,809, compared with \$8,658,316 and \$1,094,927 respectively in the previous year.

Mrs. Charles J. Butler

DETROIT—Mrs. Charles J. Butler, wife of the recently retired president and general manager of the Morgan & Wright plant of United States Rubber Co., died here Thursday. Mrs. Butler was the former Emma Seiberling of Akron, Ohio, whose father was one of 10 brothers prominent in founding some of Ohio's leading industries.

Hercules Reports Loss

CANTON, O.—A deficit of \$129,814 after depreciation and other charges but before dividends of \$62,020, is reported by the Hercules Motor Corp. for 1932. This compares with a net income of \$324,861 and dividends of \$280,890 in 1931.

Comparative data from the balance sheet follow:

	1932	1931
Cash	\$ 330,492	\$ 585,427
Cert. of Dep.	51,317
Securities	500,506	94,567
Total current assets	1,787,975	1,925,919
Total current liab..	117,257	177,215
Working capital ..	1,670,718	1,748,704

Angell Elected to Evans Board

DETROIT.—W. R. Angell, president of Continental Motors Corp., has been elected director of Evans Products Corp., to succeed G. H. Lundberg, resigned. Prewitt Semmes was elected secretary to succeed Mr. Lundberg, who becomes head of one of the operating divisions of the corporation. Other directors and officers were re-elected. E. S. Evans, president, told stockholders in the annual meeting that the corporation had suffered no serious effects from the banking situation.

Automotive Sheets in Better Demand

Galvanized Sheet Prices to Be Raised on April 5

NEW YORK—Chicago district sheet mills were reported to have booked in the last few days the heaviest tonnage ordered in any one week in a year and a good share of the business is reported to have come from automotive consumers. Automotive demand has also caused a return to very nearly the rate of operations that prevailed in Cleveland district rolling mills before the "bank holiday." Business from General Motors parts-making subsidiaries is the chief sustenance of the market. A good deal of demand is slow in coming out because of merely temporary difficulties in financing.

All in all, the steel market is taking a more cheerful view of the long-range outlook than it did immediately before the "bank holiday." A good deal of business in galvanized sheets has been "smoked out" by announcement that the current 2.60c., Pittsburgh, price would cease to apply to orders placed after next Wednesday when a \$2 per ton advance on new business will go into effect. Depending upon how closely the new price level will be adhered to, efforts to readjust prices for automotive descriptions of sheets in similar fashion are freely predicted. Producers insist that the 2.30c. price for full cold-rolled, 20-gage entails an out-and-out loss on every ton sold and that this item must be the first to come in for rectification as soon as conditions permit. Demand for automotive alloy steels is light, but prices hold steady.

Pig Iron—Middle West blast furnaces have booked considerably more business in the last two weeks than they had in many months. The Cleveland and Chicago markets have turned strong and some consumers are beginning to protect themselves against advances by contracting for their full second-quarter requirements.

Aluminum—Quiet and unchanged.

Copper—Consuming demand is light. Quite a little copper is being sold for export, however, in keen competition with the leading South African producer. The holders of the heaviest tonnages in the United States are said to be holding for higher prices.

Tin—Straits tin was quoted at 24½c. at the beginning of the week with consuming demand very light.

Lead—The market steadied somewhat following declines which brought the leading interest's contract price to 3c., New York.

Zinc—Dull and easier.

Transport Interests Draft New Bill Regulating Interstate Motor Carriers

WASHINGTON, D. C.—Meeting here last Friday, Saturday and Sunday motor vehicle, railroad and highway interests worked out a completed draft looking to motor vehicle regulation that it is understood will be presented to the Roosevelt administration for consideration in connection with its pending plan for transport legislation at the present session. It is believed that the proposed legislation outlined will fit in with the administration program and that it will be accepted by Representative Rayburn of Texas, chairman of the House Committee on Interstate and Foreign Commerce. Meanwhile, Mr. Rayburn has held up his motor vehicle regulation bill and hearings on it till the administration program is formally laid before Congress. The proposed bill of the joint interests for motor vehicle regulation is more rigid than that drafted into the Rayburn bill.

The meeting was held by the National Association of Bus Operators, the American Highway Freight Association, the American Electric Railway Association and the Association of Railway Executives.

The bill proposed as the result of the meeting is the same as the one previously drawn by the joint interests except that it eliminates the federal license fee feature. The railroads and truck operators, if called upon as

to how regulation would be financed, are understood to be prepared to recommend the license fee plan.

The Utilities Commissioners insisted upon a provision denying the right of the Interstate Commerce Commission to regulate intrastate rates even where discrimination against interstate commerce is shown.

The bill as drawn provides that every common carrier in interstate commerce of passengers and property shall be required to take out a certificate of public convenience and necessity and shall be regulated as to rates by the Interstate Commerce Commission. Permits would be required of all contract carriers in interstate commerce which would operate under minimum rates fixed by the commission. Each vehicle owner would be required to register his vehicle and a license fee, the amount of which was not fixed upon, would have to be paid.

Chairman Rayburn also has present a railroad holding company bill calling for repeal of section 15a, relating to rate making and recapture.

The administration program, so far as known at present, provides for at least three features:

Truck and bus regulation.

Railroad consolidation and coordination with motor, waterways and other form of transportation.

Reorganization of governmental

agencies. This is believed by some to indicate the setting up of a separate Department of Transportation and Communication, to take over some of the powers of the Interstate Commerce Commission, but probably to leave the Commission with powers of regulation and rate making.

In addition to the Rayburn bill, which has been reintroduced at the present session, two others are before Congress. One sponsored by Representative Bacon would subject motor carriers to every regulation now imposed on railroads, except where such regulation is obviously inapplicable, while a bill introduced by Representative Boland provides for levying of mileage taxes on carriers.

Muskegon 1932 Statement

DETROIT—Muskegon Motor Specialties reports a net loss of \$167,802 for 1932 after depreciation and other charges, as compared with a profit of \$64,684 in 1931. After dividends of \$50,000 and other surplus adjustments, the decrease in surplus in 1932 amounted to \$233,048, leaving a balance sheet deficit of \$73,094.

Current assets at the year end were about 2½ times current liabilities, as the following comparisons show:

	1932	1931
Cash	\$57,779	\$80,809
Securities	270,271	249,280
Total current assets.....	511,410	516,724
Total current liabilities.....	206,764	119,356
Working capital	304,646	397,368

Exports, Imports and Reimports of the Automotive Industry For February and Two Months Ended February, 1933-1932

	Month of February 1933		1932		Two Months Ended February 1933		1932	
	Number	Value	Number	Value	Number	Value	Number	Value
Automobiles, parts and accessories.....		\$6,237,289		\$7,432,873		\$12,886,630		\$14,197,397
Motor trucks, buses and chassis (total).....	3,136	1,279,854	2,113	934,849	6,220	2,435,771	4,628	2,076,146
Under one ton.....	213	56,137	344	87,293	554	136,115	691	176,884
One and up to 1½ tons.....	2,582	892,637	1,561	580,848	5,109	1,781,010	3,553	1,377,959
Over 1½ tons to 2½ tons.....	263	197,684	138	108,869	411	314,548	246	237,666
Over 2½ tons.....	48	74,135	44	99,633	92	136,637	91	192,182
PASSENGER CARS								
Passenger cars and chassis.....	5,521	2,831,436	4,930	2,661,618	12,580	5,979,779	9,404	5,089,084
Low price range \$850 inclusive.....	5,024	2,208,270	4,191	1,855,070	12,580	4,877,169	8,068	3,627,274
Medium price range over \$850 to \$1,200.....	252	248,612	522	508,303	514	498,578	927	894,245
\$1,200 to \$2,000.....	193	325,642	122	166,301	296	463,166	197	268,445
Over \$2,000.....	19	41,332	44	110,447	54	123,094	100	254,116
PARTS, ETC.								
Parts except engines and tires.....		984,026		2,205,936		1,990,762		3,685,487
Automobile unit assemblies.....		829,281		1,010,998		1,621,414		2,088,310
Automobile parts for replacement (n.e.s.).....		105,881		195,286		229,387		359,636
Automobile service appliances.....		9,105		190,042		44,788		303,841
Airplanes, seaplanes, and other aircraft.....	41	493,748	12	48,159	96	1,095,387	20	165,008
Parts of airplanes, except engines and tires.....		109,057		99,327		209,052		158,460
INTERNAL COMBUSTION ENGINES								
Stationary and Portable								
Diesel and Semi-Diesel.....			5	21,575	1	5,440	9	58,878
Other stationary and portable.....								
Not over 10 hp.....	250	14,665	254	15,827	483	30,096	557	37,959
Over 10 hp.....	22	18,834	64	22,642	76	35,865	105	89,474
Automobile engines for:								
Motor trucks and buses.....	67	11,593	267	49,885	181	37,856	558	86,227
Passenger cars.....	1,318	91,659	1,366	146,645	2,069	158,041	2,672	267,779
Aircraft.....	34	150,250	10	20,161	608	235,650	24	38,839
Accessories and parts (carburetors).....		71,992		116,410		143,280		231,448
IMPORTS								
Automobile and chassis (dutiable).....	30	26,431	32	22,929	71	42,842	66	64,208
Other vehicles and parts for them (dutiable).....		4,078		1,114		6,869		2,985

G.M. Cuts Annual Charges \$7,000,000 by Big Write-Down of Surplus Property

\$92,712,535 Taken from Depreciation Reserve in Reduction of Book Value of Unused Plant to Salvage Price—Current Ratio is 4.9 to 1

NEW YORK—General Motors has reduced its annual depreciation charges by about \$7,000,000, the corporation's annual report reveals, by writing down the book value of its surplus real estate, plant and equipment from \$115,491,496 to an estimated salvage value of \$22,779,411. The difference of \$92,712,535 is charged to depreciation reserves. So long as the facilities covered by this write-down continue unused, they will be carried at salvage value and hence not subject to further depreciation.

"The question very naturally arises," the report says, "in view of the adjustments in values that have

facts, the following action has been taken with respect to same:

"Surplus real estate, plant and equipment in the amount of \$115,491,946, previously carried at cost, has been adjusted to estimated salvage value of \$22,779,411, the difference of \$92,712,535 being charged against reserves for depreciation, which have already been provided, so that the net book value of the plant account amounting to \$328,273,745 remains unchanged.

"The effect of the above will be (a) a readjustment in the real estate, plant and equipment account in the form of a reduction of \$92,712,535—

	1932	1931
Net Sales	\$432,311,868	\$808,840,723
Depreciation	37,173,647	37,965,731
Net Income (G.M.'s portion)	164,979	96,877,107
Preferred Dividends	9,206,387	9,375,899
Earnings on Common	9,041,408	87,501,208
Common Dividends	54,375,000	130,500,001
Cash	151,152,747	119,842,358
U. S. Securities	19,327,083	74,615,059
Other Marketable Securities	2,300,865	10,571,702
Inventories	75,478,612	106,471,332
Total Current Assets	283,258,874	358,502,579
Current Liabilities	57,821,680	84,586,656
Working Capital	225,437,194	273,915,923
Reserve for Depreciation	171,708,486	241,472,694
Plant & Property after deprec.	328,273,745	362,628,116
Surplus	238,231,744	301,266,482

d—deficit.

taken place as a result of the economic depression, as to whether or not the reserves established by the corporation from year to year are adequate to reflect properly any reduction in value of the real estate, plant and equipment account that may develop under existing circumstances. Unquestionably, these circumstances in extent are of temporary character, but the degree to which that is true is impossible to state with certainty at this time. Consolidations and eliminations of a portion of the corporation's plant are a natural and necessary sequence to a situation through which all industry is at the moment passing, so that there results property that temporarily, at least, is unusable. In order that facts might be available with respect to these questions, a study has been made during the year under review, with the following result:

"It can be stated that the reserves set up for depreciation are sufficient to write down to salvage value all real estate, plant and equipment which has become completely idle and further, to readjust the values of all plant which remains in operation to its 1932 reproductive value, less depreciation.

"Having established the above

from \$592,694,766 to \$499,982,231, with a corresponding reduction in the reserve for depreciation from \$264,421,021 to \$171,708,486, which will reflect more correctly present conditions; (b) since such items have been reduced to their salvage value, they will no longer be depreciated, so that in the future the annual provision for depreciation applicable to real estate, plant and equipment will be reduced by approximately \$7,000,000" This adjustment will involve no change in the corporation's depreciation policy with respect to annual depreciation rates as applied to the several classes of property.

When economic conditions improve, requiring the operation of plant, un-

Federal Reserve Business Indexes

(1923-1925=100)

	Industrial Production	Automobile Production
Feb., 1933	64*	33*
Jan., 1933	65	48
Feb., 1932	69	35

*Preliminary.

usable under present conditions, the policy will be to reinstate in the accounts the then values of such properties, and to amortize such values over their remaining useful life by charges against operations for depreciation—thus to maintain the accuracy of the corporation's cost accounting. "There is certainly no economic justification," the report says, "in reducing the value of current usable assets below their sound reproductive value, eliminating in that way, in whole or in part, depreciation not only actually but essentially a part of the cost of production, hence uneconomically inflating future stated profits."

Packard Reports \$6,824,312 Loss

Liquidity Maintained With Working Capital of Over \$18,000,000

DETROIT—Packard reports a deficit of \$6,824,312 after depreciation and the creation of a \$1,000,000 reserve against possible loss on bank deposits. This compares with a net loss of \$2,909,117 and a deficit of \$9,654,770 after dividends last year.

Comparative data from the consolidated income account and the balance sheet follow:

	1932	1931
Sales	\$15,515,695	\$29,987,159
Depreciation	2,076,633	2,454,345
Net loss	6,824,312	2,909,117
Dividends	6,745,653
Deficit	6,824,312	9,654,770
Cash	3,340,139	3,412,832
U. S. securities	9,171,875	7,875,750
Mun. and state bds., etc.	875,598	2,705,904
Inventories	5,762,734	7,874,067
Total current assets	20,449,524	24,519,318
Total current liab.	2,324,590	3,123,154
Working capital	18,124,934	21,396,164
Property, depreciated	31,318,711	33,441,952
Capital stock	40,000,000*	50,000,000
Surplus	8,398,250*	5,222,563

*After transferring \$10,000,000 from capital stock account to surplus.

\$1,000,000 More for Tires

TORONTO, ONT.—Purchase of automobile tires and inner tubes will cost the Canadian motorists about \$1,000,000 extra if the newly imposed 5 per cent excise tax is passed on to the consumer by the manufacturer, figures for consumption of these items show.

Hall Has Canadian Subsidiary

WALKERVILLE, ONT.—Hall Manufacturing Co. of Canada, Ltd., a subsidiary of a Toledo, Ohio, company has secured premises here, and will manufacture boring bars, cylinder hones, and other automotive equipment machinery.

Louis W. Schimmel

DETROIT—Louis W. Schimmel, founder of the Detroit Gray Iron Foundry Co. and the Detroit Alloy Steel Co., died here recently.

Gear Manufacturers to Meet May 4 to 6

PHILADELPHIA—The annual meeting of the American Gear Manufacturers Association will be held at the Penn-Lincoln Hotel, Wilkesburg (Pittsburgh), Pa., May 4, 5 and 6. The following papers are scheduled for presentation at the meeting:

"Bullard-Dunn Process for Descaling Metals as Applied to the Cleaning of Heat-Treated Gears," by F. T. Taylor, The Bullard Co.

"Heat Treatment of Transmission Gears," by E. F. Davis, metallurgist, Warner Gear Co.

"Welded Gears," by Everett Chapman, director of research and engineering, Lukenweld, Inc.

"Lapping of Gear Teeth," by Robert S. Drummond, president, National Broach & Machine Co.

"Combination Motor and Reducer Units," by Richard S. Marthens, manager, Gearing Engineering Dept., Westinghouse Electric & Mfg. Co.

Eleven sections of the Standards Committee will present reports, and Chairman E. S. Sawtelle of the Commercial Standards Committee has ar-

ranged for the presentation of two one-act plays: "A Sales Lesson" and "What Was Left Out." One afternoon has been set aside for departmental sessions which will be presided over by H. H. Kerr of the Boston Gear Works, Inc. E. W. Miller of the Fellows Gear Shaper Co., president of the association, will preside.

Best 10-Day Sales Period Indicated for Studebaker

SOUTH BEND—The rate at which orders for cars has continued during the last week indicates that Studebaker total factory sales for the final ten days will be at least equal to those of any ten days since the beginning of the year, according to Paul G. Hoffman, president, Studebaker Sales Corp.

Aside from the legal maneuvers of a few creditors, no new developments in the receivership proceedings have been reported this week.

All Truck Parts Ruled Taxable

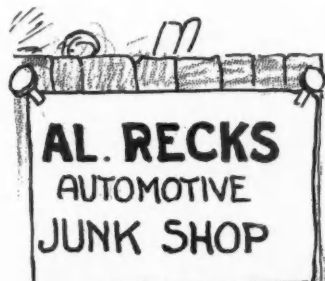
NEW YORK.—All the articles excepting commercial commodities and raw materials listed in the parts catalog of a large truck manufacturer have been ruled taxable by the Bureau of Internal Revenue, the N. A. C. C. reports.

The term "commercial commodities" includes such articles as ball and roller bearings; bolts (except shackle and king bolts); nuts, washers, screws, nails, tacks, rivets, pins, studs, cotter, pipe fittings such as plugs, tees, elbows, and drain cocks, grease cups, oilers, etc.

The term "raw material" includes such articles as cloth, leather, matting, linoleum, and similar articles sold by the yard; materials sold in rolls or by the foot, such as brake lining, anti-squeak, tape, binding, wires, cables, tubing both metal and rubber, packing, conduits, etc.

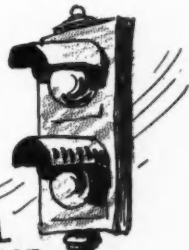
Automotive Oddities—By Pete Keenan

Write us if you know an Oddity



SIGN IN JACKSONVILLE, Fla.

UNTIL LAST YEAR THERE WAS ONLY ONE TRAFFIC LIGHT IN THE WHOLE STATE OF NEVADA.



RAJAH RABBIT

CAN FLY AN AIRPLANE BLINDFOLDED BY READING THE MIND OF

ANOTHER PILOT WHO IS TIED AND BOUND IN THE SAME PLANE.



IN THE OLD DAYS GASOLINE WAS TOWED OUT TO SEA AND DUMPED AS A WASTE BI-PRODUCT OF KEROSENE.



MR. 54⁹⁹ (PHIFER) of Stockton, California. HIS AUTOMOBILE NUMBER IS 54. HIS TELEPHONE NO IS 54.

New Duties for C. H. Vincent

DETROIT.—C. H. Vincent, manager of the Packard Motor Car Co. proving grounds, has been named chief inspector of the company, in addition to his duties at the proving grounds. C. S. Stark is assistant chief inspector.

Terraplane Sets New Records

CHATTANOOGA, TENN.—New records for the Lookout and Signal Mountain climbs have been set by an Essex Terraplane Six. The former climb of 5.2 miles was negotiated in 5 min. 35 sec., and the latter 3.7 miles in 4 min. 10 sec.

Overland Program Still Incomplete

(Continued from page 412)

continue on this order after May must be made by April 10.

As a going concern on Feb. 15, independent auditors found that the company had a net worth of \$27,621,115. Mr. Miller testified, represented by assets of \$36,471,865 and liabilities of \$8,850,750.

To finance the new models, Mr. Miller also explained that Willys-Overland sold its parts department to the Willys-Overland Parts Corp. for \$800,000 in cash to get the 77 into production. This company was financed by the Hydeborn Co. which in turn was backed by a group of investment companies representing personal fortunes of Mr. and Mrs. Willys, the Electric Auto-Lite Co., and others. The Hydeborn Co. purchased cars as they were finished to provide Overland with operating capital. Hydeborn now has 2300 Willys 77's on hand. Total obligation to Auto-Lite is \$216,200. Willys-Overland itself has about 500 cars on hand valued at \$162,500. Also on hand are 1592 partially completed cars but these will not be completed except on court order, until present stocks are sold.

Current assets amount, Mr. Miller said, amounted to \$2,309,615. County tax claims are \$472,100. Approximately \$57,000, which the company had in the bank when the receivership became effective, and \$44,000 is frozen in the First National Bank here now in the hands of a conservator.

During the hearing on the wage petition, the court said that the present receivers and their counsel were appointed because the court felt that they were the men best able to handle the job. "If it appears at any time that somebody can do this better than these men," the court said, "the court is willing to appoint other men. . . . If anyone has any fault to find with anything; if anyone has any suggestion to make, constructive or otherwise, this court is open."

National Accessory Distribution Through Voluntary Retail Chains Planned by A. I. D.

CHICAGO—The national voluntary chain system of wholesale and retail distribution which has been operated successfully in the food, drug and other industries, is being launched in the automotive accessory field.

After a year's experimentation on a sectional basis in New Jersey and Rhode Island, in cooperation with the Economy Auto Supply Co. of Newark, N. J. and the Franklin Auto Supply Co. of Providence, the Allied Independent Dealers has been organized to function as a national alliance in the distribution of automotive accessories, supplies and related items. A new corporation has been formed and a national headquarters established here.

J. Frank Grimes of this city, well known as president and founder of the Independent Grocers' Alliance—I. G. A.—and the Independent Drug-gists' Alliance—I. D. A.—is president. These two organizations will be used as a pattern in building the A. I. D. Bernard Miller, president of the Economy Auto Supply Co., is vice-president and his son, Leon, sales-manager of Economy, also will be associated with A. I. D. headquarters.

New Packard Formal Sedan

DETROIT.—Packard Motor Car Co. has announced a new body type which it calls a Formal Sedan. The new car fills the gap between a sedan and limousine, and can be either an

owner or chauffeur driven car by a few turns of an easily operated handle in the rear compartment which raises a wide glass partition from a concealed pocket in the back of the front seat. The glass slides in channels in the door pillar posts and fits snugly against the upholstering cloth of the ceiling.

List prices for the new body follow: Packard Eight, \$3085; Super Eight, \$3600; Twelve, \$4560.

Bendix Reports Loss of \$1,601,242 in '32

CHICAGO—Bendix Aviation Corp. reports net loss after depreciation and other charges of \$1,601,242 for 1932 as compared with a net profit of \$1,555,479 in 1931. The year-end balance sheet reveals for the first time the write-down of patent rights, etc., and the changes in the capital stock authorized by the directors several months ago. Comparative data follows:

	1932	1931
Patent rights, etc.	\$ 1	\$36,800,624
Capital stock	10,488,315	52,441,175
	(\$5 par)	(No par)
Surplus	11,438,120	8,988,929
Total assets	23,438,120	64,342,440
Current assets	7,947,036	9,803,496
Current liabilities	1,340,218	2,142,065
Working capital	6,606,818	7,661,431

As a result of the capital changes, a substantial saving will be made in the corporation's franchise and license taxes.

British Ford Strike Ended by Higher Pay

LONDON, ENGLAND—The strike which closed the Ford plant at Dagenham on Monday, came to an end on Wednesday with the announcement that an agreement had been reached. New wage scales, higher than the schedules which precipitated the troubles and ranging from minimums of 39 cents an hour for skilled workers to a minimum of 26 cents for unskilled for a 40 hr. week, have been adopted. The strike affected about 7000.

Automotive Employment

WASHINGTON, D. C.—Automotive employment declined slightly in February to 50.8 from 51.6 in January, while payrolls decreased from 35.3 to 31.3, according to Labor Department indexes.

W-O Final Claim Date

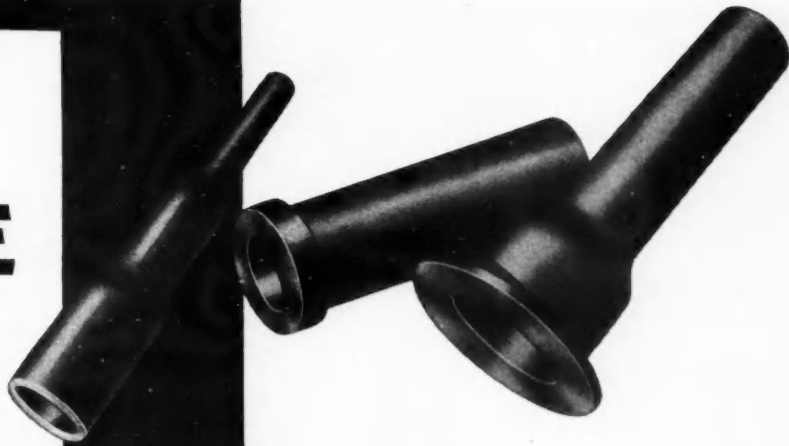
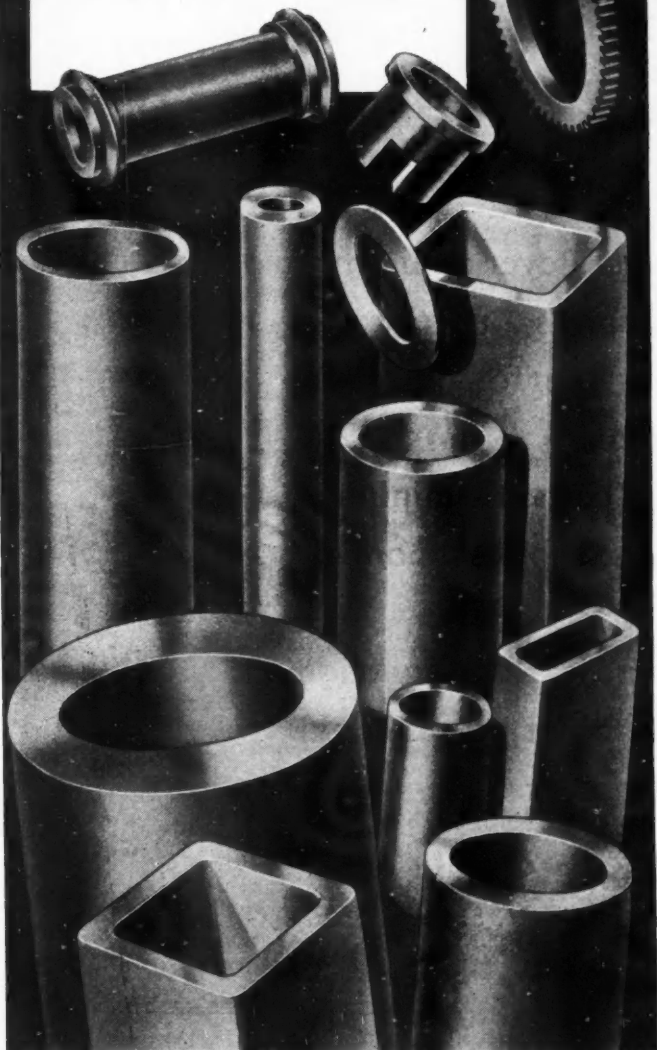
TOLEDO—Federal Judge Hahn has set May 24, 1933, as the final date for filing claims against Willys-Overland.

CALENDAR OF COMING EVENTS

MEETINGS

National Machine Tool Builders Assoc. Annual Meeting, Cleveland,	April 24-25
Natl. Foreign Trade Council, Annual, Pittsburgh	April 26-28
U. S. Chamber of Commerce Meeting, Washington, D. C.	May 2-5
American Gear Mfg. Assoc., Wilkesburg, Pa.	May 4-6
Natl. Automobile Chamber of Commerce, Annual, New York City	June 8
Natl. Retail Hardware Assoc., Indianapolis	June 12-16
American Society for Testing Materials, Chicago	June 26-30
Automotive Engine Rebuilders Assoc., Annual, Chicago	July 10-14
Natl. Safety Council, Chicago	Oct. 2-6
National Metal Congress, Detroit	Oct. 2-6
American Petroleum Institute, Annual, Chicago	Oct. 24-26

Yes
**IT CAN BE
 MADE
 FROM
 TUBING**



Axles, axle housings, drive shafts, drive shaft housings, tie rods, steering columns, steering rods, and many smaller, though important, automotive parts can be made to better advantage from NATIONAL-SHELBY Seamless Mechanical Tubing. Large or small, thick or thin, whatever diameter or wall-thickness you need, will be found available in this handy product. There are different shapes for specific applications. Various carbons and S. A. E. alloy compositions can be furnished, and treatments varied according to use.

Try it! You will be surprised at the many practical advantages. An increasing number of manufacturers are using mechanical tubing. Machine work, tools, and labor are economized. More satisfactory results are obtained.

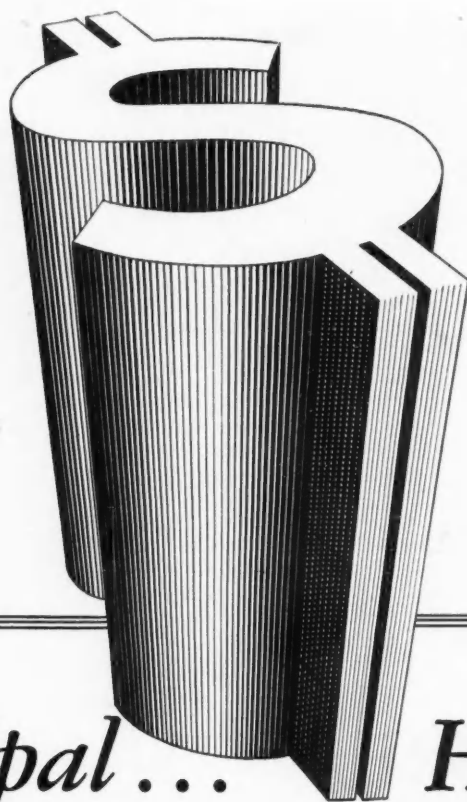
Write for booklet, "Seamless Tube Standards"; a copy will be mailed on request. Or better still, if you care to send your sketches or blue-prints, they will be given a studied analysis, with indicated possible applications of NATIONAL-SHELBY Mechanical Tubing—

America's Preferred Seamless Tubing

NATIONAL TUBE COMPANY Pittsburgh, Pa.

Subsidiary of United  States Steel Corporation

NATIONAL-SHELBY
SEAMLESS MECHANICAL TUBING



Safe Principal ... High Interest

HERE'S a principal that never diminishes, that remains constant as a potent asset—the dependably good performance of Lockheed Hydraulic Brakes.

The interest is no less certain—minimum assembly cost; and easiest, most economical selling.

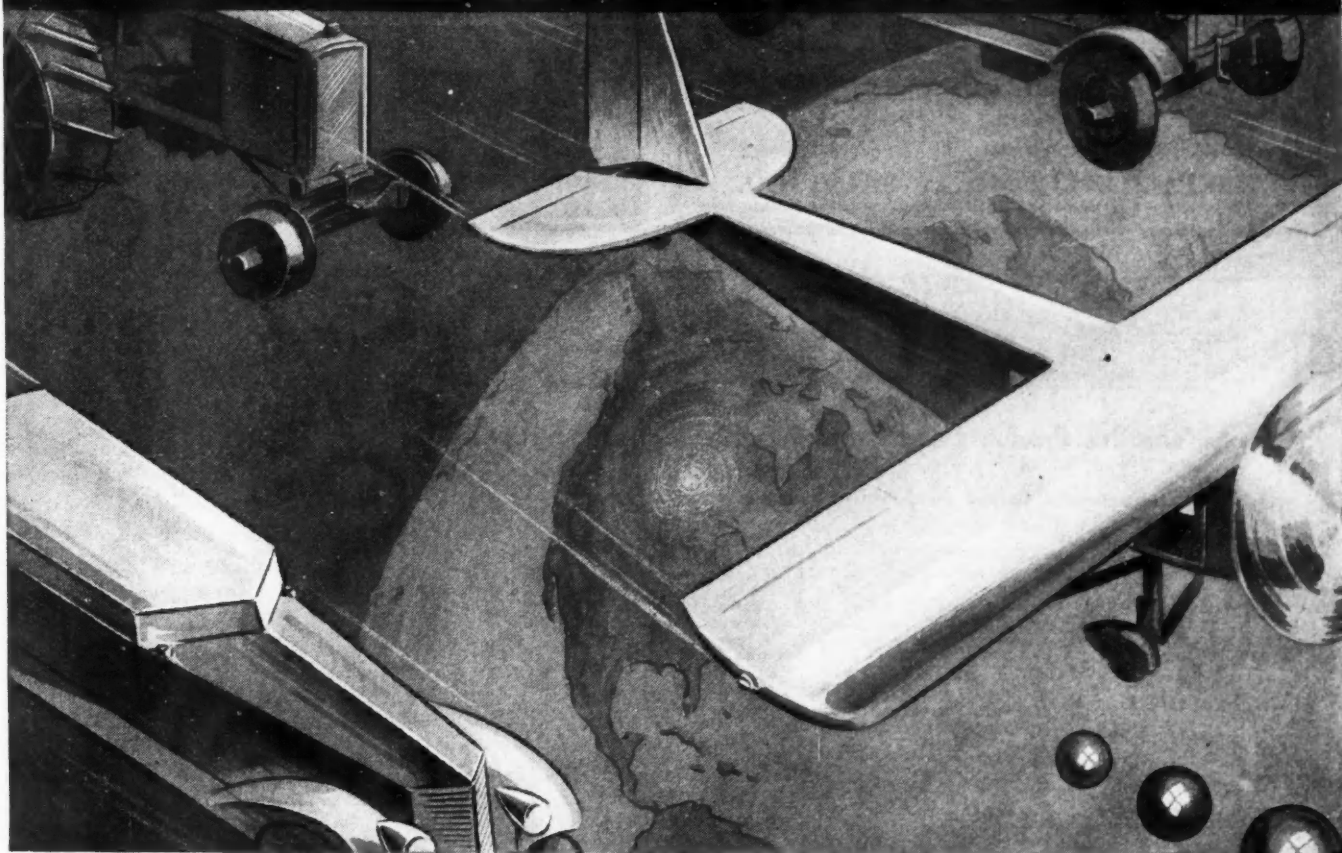
Security?—the best there is: the conviction of users—on good cars, trucks, buses—that Hydraulics are the ideal brakes.

HYDRAULIC BRAKE COMPANY
DETROIT, MICHIGAN, U. S. A.

LOCKHEED HYDRAULIC

Four **BRAKES** *Wheel*

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As a buyer of alloy steels you are naturally more interested in the quality of a company's product than in the magnitude of its operations. But, reflect for a moment:

- Republic could have achieved its position as the world's largest producer of alloy steels only by successfully meeting the rigid requirements of a larger number of consumers of automotive, roller bearing, ball bearing and other quality steels.
- In building its clientele, Republic must have rendered superior metallurgical service.

Metallurgists who pioneered in the development of alloy steels...men who first offered to the industry the alloy compositions now standardized in the S. A. E. 4100, 4600, 5100 and 6100 series...the facilities of America's largest metallurgical laboratories...modern electric and open hearth furnaces...improved rolling mills — these and many other advantages are at your disposal. Avail yourself of them!

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MULTIPLE SPINDLE DRILLING AND TAPPING MACHINES.
AUTOMATIC SCREW MACHINES. SPECIAL MACHINERY**BUYERS' GUIDE**

Automotive Products and Factory Equipment Manufactured by Advertisers in This Issue

See Alphabetical List of Advertisers on Page 43

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Axes Park Drop Forge Co.	Crankshafts Park Drop Forge Co.	Heat Treating Barnes-Gibson-Raymond, Inc. Barnes Co., Wallace Gibson Co., Wm. D.	Removers, Enamel & Paint American Chemical Paint Co.	Carbon Republic Steel Corp.
Bearings, Anti-Friction Ball New Departure Mfg. Co. S K F Industries, Inc. Roller Hyatt Roller Bearing Co. S K F Industries, Inc. Thrust S K F Industries, Inc.	Dashes, Truck Stolper Steel Products Corp.	Hoods Stolper Steel Products Corp.	Rust Removers & Preventives American Chemical Paint Co.	Cold Drawn Republic Steel Corp.
Bending & Straightening Machines Chambersburg Engineering Co. Chambersburg-National Co. National Machinery Co.	Drilling Machines Foote-Burt Co. Greenlee Brothers and Co. (Multiple Spindle)	Hose, Flexible Metallic (Radiator & Fuel Lines) Titeflex Metal Hose Co.	Screw Machine Products Barnes Co., Wallace	Spring Barnes-Gibson-Raymond, Inc. Barnes Co., Wallace Gibson Co., Wm. D.
Boring Machines Foote-Burt Co.	Enamels American Chemical Paint Co. (Rust Proofing)	Insulating Material Continental-Diamond Fibre Co.	Screw Machines Greenlee Brothers & Co. Potter & Johnston Machine Co.	Stainless Republic Steel Corp.
Brakes Hydraulic Hydraulic Brake Co. Mechanical Bendix Brake Co. Power Bendix Aviation Corp. Bragg-Kliesrath Corp.	Felt American Felt Co.	Lathes Automatic Chucking Potter & Johnston Machine Co. Turret Potter & Johnston Machine Co.	Shafting New Departure Mfg. Co.	Strip Republic Steel Corp. Thomas Steel Co.
Brake Testers Bendix Aviation Corp.	Fenders Stolper Steel Products Corp.	Molded or Machined Parts (Phenolic) Continental-Diamond Fibre Co.	Shock Absorbers John Warren Watson Co.	Tank Support Straps Stolper Steel Products Corp.
Bushings Fibre Continental-Diamond Fibre Co.	Fibre Rods, Sheets, Tubes Continental-Diamond Fibre Co.	Pads Felt American Felt Co.	Special Machinery Greenlee Brothers & Co.	Tanks Stolper Steel Products Corp.
Carburetors Bendix Aviation Corp.	Forgings Park Drop Forge Co.	Paints American Chemical Paint Co. (Heat Resisting)	Springs Extension, Compression Torsion or Flat Barnes-Gibson-Raymond, Inc. Barnes Co., Wallace Cook Spring Co. Gibson Co., Wm. D. Hubbard Spring Co., M. D. Raymond Mfg. Co.	Tapping Machines Foote-Burt Co. Greenlee Brothers & Co.
Channels for Glass Felt American Felt Co.	Furnaces Electric (Annealing, Carburizing, Heat Treating, Forging & Welding) Electric Furnace Co.	Pickling Compounds American Chemical Paint Co.	Stampings or Drawings, Metal Barnes-Gibson-Raymond, Inc. Barnes Co., Wallace Cook Spring Co. Gibson Co., Wm. D. Hubbard Spring Co., M. D. Raymond Mfg. Co. Stolper Steel Products Corp. Worcester Stamped Metal Co.	Tubing Flexible Metal Titeflex Metal Hose Co. Steel National Tube Co.
Cleaners Metal American Chemical Paint Co. (Rust Preventive)	Gaskets Felt American Felt Co.	Pipe, Wrought Steel National Tube Co.	Starters Drives Bendix Brake Co.	Turret Machines, Automatic Potter & Johnston Machine Co.
Clutches Bragg-Kliesrath Corp. Long Mfg. Co.	Gear Material Non-Metallic Continental-Diamond Fibre Co.	Plating, Cadmium United Metals Selling Co.	Steam Cooling Rushmore Laboratory	Washers Felt American Felt Co. Lock Shakeproof Lock Washer Mfg. Co.
Couplings Pipe & Tubing National Tube Co.	Gears, Timing Non-Metallic Continental-Diamond Fibre Co.	Plugs, Expansion Hubbard Spring Co., M. D.	Steel Alloy Republic Steel Corp. Bars Republic Steel Corp.	Plain Metal Hubbard Spring Co., M. D.
	Grinding Machines Landis Tool Co.	Presses Chambersburg Engineering Co. Chambersburg-National Co. National Machinery Co.		Wicks Felt American Felt Co.
	Hammers, Power Chambersburg Engineering Co. Chambersburg-National Co. National Machinery Co.	Radiators Long Mfg. Co.		Wire Flat Round Square or Special Shape Barnes Co., Wallace Spring Barnes Co., Wallace Republic Steel Corp.
	Hangers, Shafting New Departure Mfg. Co. S K F Industries, Inc.			Zinc United Metals Selling Co.

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A QUARTER OF
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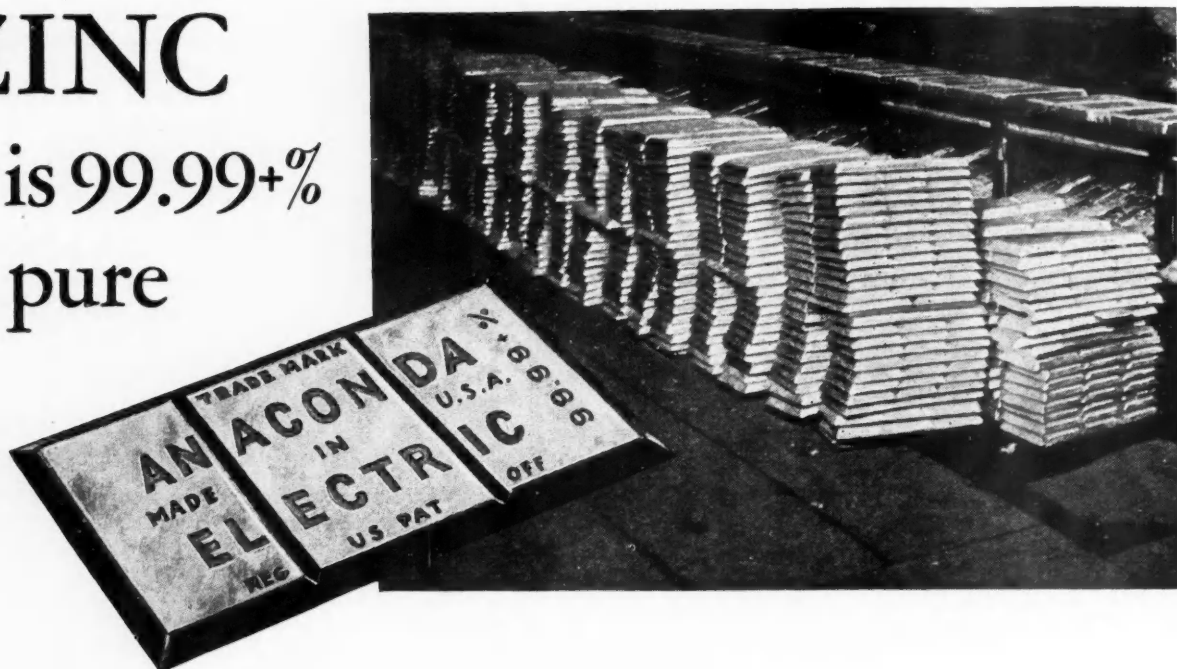
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that is 99.99+%
pure



INDUSTRY now consumes thousands of tons of Zinc of a purity attainable a few years ago only by the chemist in his laboratory. And, today, Anaconda Electric Zinc... *guaranteed 99.99+% pure*... is accepted as standard by users of high grade Zinc. ¶ This high degree of purity is made possible by the *electrolytic* refining process which was pioneered and developed by Anaconda. ¶ Anaconda Electric Zinc is supplied in 50-lb. slabs, each one clearly marked "ANACONDA ELECTRIC 99.99+%" Whenever you use this well-known brand you may be sure that *every* slab is uniform in quality... is by *analysis* 99.99+% pure.

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April 1, 1933

Automotive Industries

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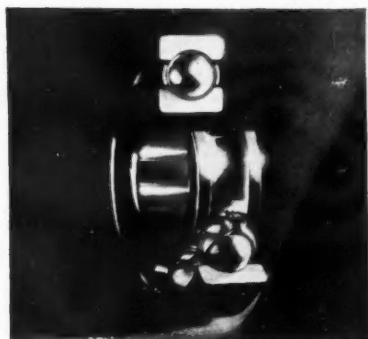
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BRUTE BEARINGS

TWELVE of these Model AC, four-cylinder, chain driven Macks, equipped with 10-yard, side-dump steel bodies are on a real brute job...hauling rock from quarry to crusher...and that certainly calls for brute bearings. **SKF's** fill that bill of particulars to the utmost satisfaction on many locations in these trucks...reason enough why **SKF** Performance Takes Preference Over Price.



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● The jolting rear seat ride, characteristic alike of cars built in 1908 and 1933—a full quarter century of them, can be remedied in just one way—softer front springs.

These softer front springs however cannot safely be used until a shock absorber is devised which will control them with infallibility. Not one stroke must ever be missed.

Infallible shock absorber action is awaited to change the whole basic

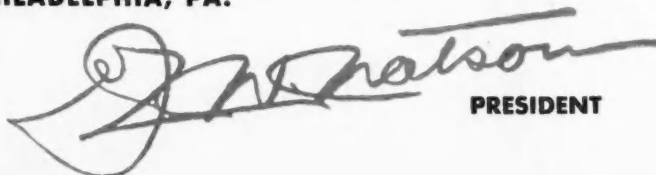
matter of motor car riding comfort. Millions of present-day motor cars will be "traded in" instantly this new basic ride is offered.

The New Watson Double-Acting GYRO Stabilators act with infallibility in the control of motor car springs. The basic change in motor cars is therefore now imminent.

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GYRO

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